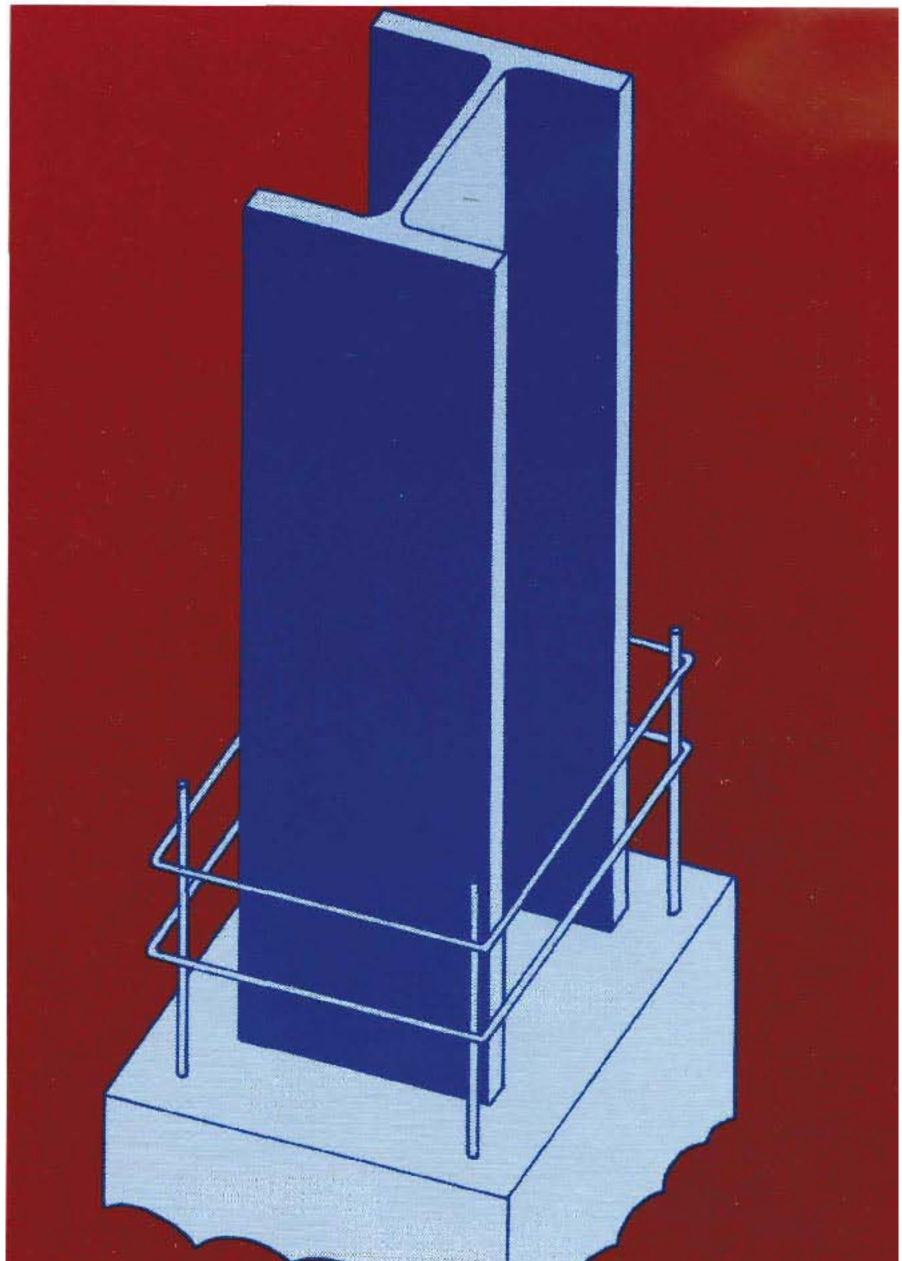
Steel Design Guide Series 6

Load and Resistance Factor Design of W-Shapes Encased in Concrete



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Load and Resistance Factor Design of W-Shapes Encased in Concrete

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PREFACE

This booklet was prepared under the direction of the Committee on Research of the American Institute of Steel Construction, Inc. as part of a series of publications on special topics related to fabricated structural steel. Its purpose is to serve as a supplemental reference to the AISC Manual of Steel Construction to assist practicing engineers engaged in building design.

The design guidelines suggested by the authors that are outside the scope of the AISC Specifications or Code do not represent an official position of the Institute and are not intended to exclude other design methods and procedures. It is recognized that the design of structures is within the scope of expertise of a competent licensed structural engineer, architect, or other licensed professional for the application of principles to a particular structure.

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LOAD AND RESISTANCE FACTOR DESIGN OF W-SHAPES ENCASED IN CONCRETE

INTRODUCTION

Structural members comprised of steel shapes in combination with plain or reinforced concrete have been utilized by engineers for many years. Early structures simply took advantage of the protection that the concrete afforded to the steel shapes for resistance to fire and corrosion. But research on the strength of such members was conducted in the early 1900s,[1] and design provisions were formulated by 1924.[2] More recently, with the advent of modern composite frame construction in high rise buildings, engineers developed new rational methods to take advantage of the stiffening and strengthening effects of concrete and reinforcing bars on the capacity of encased steel shapes.

This Guide presents design tables for composite columns, developed under the sponsorship of the American Institute of Steel Construction (AISC) as an aid to the practicing structural engineer in the application of the AISC Load and Resistance Factor Design (LRFD) Specification for Structural Steel Buildings.[3] The information presented supplements that found in the AISC LRFD Manual.[4] Background on the LRFD criteria for composite columns may be found in References 5 and 6. Engineers interested in Allowable Stress Design (ASD) are encouraged to consider the procedure developed previously by the Structural Stability Research Council (SSRC).[7] The SSRC procedure is not presently included in the AISC ASD Specification.[8]

The reader is cautioned that independent professional judgment must be exercised when data or recommendations set forth in this Guide are applied. The publication of the material contained herein is not intended as a representation or warranty on the part of the American Institute of Steel Construction, Inc.—or any person named herein—that this information is suitable for general or particular use, or freedom from infringement of any patent or patents. Anyone making use of this information assumes all liability rising from such use. The design of structures should only be performed by or under the direction of a competent licensed structural engineer, architect, or other licensed professional.

SCOPE

This Guide is specifically for composite columns comprised of rolled wide flange shapes encased in reinforced structural concrete with vertical deformed reinforcing bars and lateral ties. Composite columns are defined in Section I1 of the LRFD Specification as a "steel column fabricated from rolled or built-up steel shapes and encased in reinforced structural concrete or fabricated from steel pipe or tubing and filled with structural concrete." Further, the Specification requires in Section I2.1 that the cross sectional area of the steel shape comprise at least four percent of the total composite cross section. The Commentary to the Specification states that when the steel shape area is less, the column should be designed under the rules for conventional reinforced concrete columns.

Part 1 of this Guide includes a discussion of composite frame construction, practical uses of composite columns, their advantages and limitations, and a review of important practical design considerations. A summary of the pertinent LRFD rules is presented and compared to other methods. A set of suggested design details is given in Part 2, showing placement of reinforcing bars and ties, as well as treatment of joints and base plates. Five design examples are given in Part 3 to illustrate how the tables were derived and how they are applied. Finally, a comprehensive set of tables is presented in Part 4 to assist the designer in the rapid selection of the most economical section to resist required values of factored load and moment.

PART 1: USE AND DESIGN OF COMPOSITE COLUMNS

Composite Frame Construction

Although engineers since the 1930s have encased structural steel shapes in concrete for fireproofing and corrosion protection, it was not until the development and popularity of modern composite frame construction in the 1960s that composite columns again became a common and viable structural member type. The late Dr. Fazlur Khan, in his early discussions of structural systems for tall buildings, first proposed the concept of a composite frame system[9, 10] utilizing composite columns as part of the overall wind and earthquake resisting frame. Since that time composite frame construction has been adopted for many high rise buildings all over the world. Its usage, with the composite column as the key element, is well documented in the work of the Council on Tall Buildings and numerous other publications.[11-15]

The term "composite frame structure" describes a building employing concrete encased steel columns and a composite floor system (structural steel and concrete filled steel deck).

The bare steel columns resist the initial gravity, construction, and lateral loads until such time as the concrete is cast around them to form composite columns capable of resisting the total gravity and lateral loads of the completed structure. In a composite frame building, the structural steel and reinforced concrete combine to produce a structure having the advantages of each material. Composite frames have the advantage of speed of construction by allowing a vertical spread of the construction activity so that numerous trades can engage simultaneously in the construction of the building. Inherent stiffness is obtained with the reinforced concrete to more easily control the building drift under lateral loads and reduce perception to motion. The light weight and strength obtained with structural steel equates to savings in foundation costs.

Traditionally in steel framed buildings or reinforced concrete buildings, stability and resistance to lateral loads are automatically provided as the structure is built. Welded or bolted moment connections are made or braces are connected between columns in a steel building immediately behind the erection of the steel frame to provide stability and resistance to lateral loads. Shear walls, or the monolithic casting of beams and columns, provide stability and resistance to lateral loads soon after the concrete has cured for reinforced concrete buildings. However, for composite frame structures, the final stability and resistance to design lateral loads is not achieved typically until concrete around the erection steel frame has cured, which typically occurs anywhere from a minimum of six to as much as 18 floors behind the erection of the bare steel frame. This sequence of construction is shown-schematically in Fig. 1. Thus, as discussed subsequently, *temporary lateral bracing of the uncured portion of the frame will typically be required.*

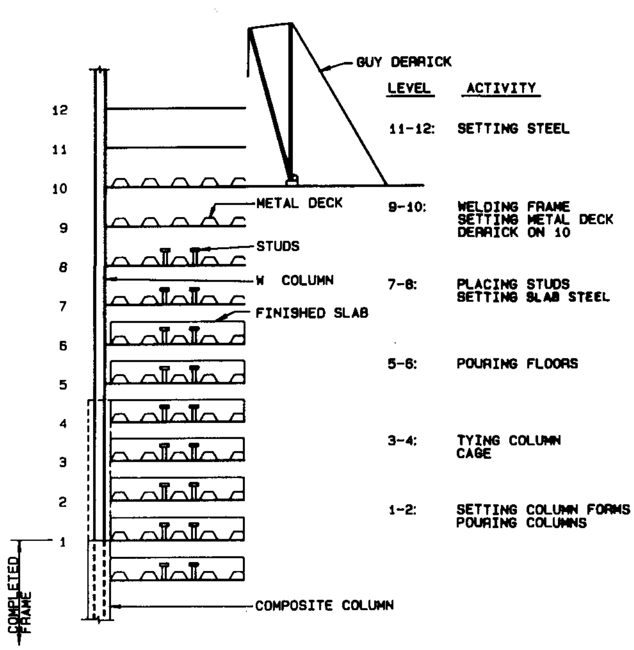

Fig. 1. Composite-frame construction sequence.

Practical Uses of Composite Columns

Practical applications for the use of composite columns can be found in both low rise and high rise structures. In low rise structures such as a covered playground area, a warehouse, a transit terminal building, a canopy, or porte cochere, it may be necessary or desirable to encase a steel column with concrete for aesthetic or practical reasons. For example, architectural appearance, resistance to corrosion, or protection against vehicular impact may be important. In such structures, it may be structurally advantageous to take advantage of the concrete encasement of the rolled steel shape that supports the steel roof structure by designing the member as a composite column resisting both gravity and lateral loads.

In high rise structures, composite columns are frequently used in the perimeter of "tube" buildings where the closely spaced columns work in conjunction with the spandrel beams (either steel or concrete) to resist the lateral loads. In some recent high rise buildings, giant composite columns placed at or near the corners of the building have been utilized as part of the lateral frame to maximize the resisting moment provided by the building's dead load. Composite shear walls with encased steel columns to carry the floor loads have also been utilized in the central core of high rise buildings. Frequently, in high rise structures where floor space is a valuable and income producing commodity, the large area taken up by a concrete column can be reduced by the use of a heavy encased rolled shape to help resist the extreme loads encountered in tall building design. Sometimes, particularly at the bottom floors of a high rise structure where large open lobbies or atriums are planned, a heavy encased rolled shape as part of a composite column is a necessity because of the large load and unbraced length. A heavy rolled shape in a composite column is often utilized where the column size is restricted architecturally and where reinforcing steel percentages would otherwise exceed the maximum code allowed values.

Advantages, Disadvantages, and Limitations

Some of the advantages of composite columns are as follows:

1. Smaller cross section than required for a conventional reinforced concrete column.
2. Larger load carrying capacity.
3. Ductility and toughness available for use in earthquake zones.
4. Speed of construction when used as part of a composite frame.
5. Fire resistance when compared to plain steel columns.
6. Higher rigidity when part of a lateral load carrying system.
7. Higher damping characteristics for motion perception in tall buildings when part of a lateral load carrying system.

8. Stiffening effect for resistance against buckling of the rolled shape.

There are also, of course, some disadvantages and limitations. In high rise composite frame construction, design engineers sometimes have difficulty in controlling the rate and magnitude of column shortening of the composite column with respect to adjacent steel columns or shear walls. These problems are exacerbated by the wide variation in construction staging often experienced in the zone between the point where the steel erection columns are first erected and the point where concrete is placed around the steel to form the composite column. This variation in the number of floors between construction activities has made it difficult to calculate with accuracy the effect of column shortening. Creep effects on the composite columns with respect to the all-steel core columns, or between shears walls, can also be troublesome to predict for the designer. The net effect of these problems can be floors that are not level from one point to another. One solution to these problems has been the measurement of column splice elevations during the course of construction, with subsequent corrections in elevation using steel shims to compensate for differences between the calculated and measured elevation.

As with any column of concrete and reinforcing steel, the designer must be keenly aware of the potential problems in reinforcing steel placement and congestion as it affects the constructability of the column. This is particularly true at beam-column joints where potential interference between a steel spandrel beam, a perpendicular floor beam, vertical bars, joint ties, and shear connectors can all cause difficulty in reinforcing bar placement and lead to honeycombing of the concrete. Careful attention must be given to the detailing of composite columns by the designer. Analytical and experimental research is needed in several aspects of composite column design. One area requiring study is the need, or lack thereof, of a mechanical bond between the steel shape and the surrounding concrete. Several papers[16,17] have discussed this question, but additional work is required to quantify the need for shear connectors with a practical design model for routine design office use. There presently is a question about transfer of shear and moment through a beam-column joint. This concern is of particular importance for seismic regions where large cyclical strain reversals can cause a serious degradation of the joint. Initial research has been completed at the University of Texas at Austin[24] and is ongoing at Cornell University on physical test models to study various joint details in composite columns.

Practical Design Considerations

Fire Resistance

Composite columns, like reinforced concrete columns, have an inherent resistance to the elevated temperatures produced in a fire by virtue of the normal concrete cover to the reinforcing steel and structural steel. It is standard practice to provide a minimum of one and one-half inch of concrete cover to the reinforcing steel of a composite column (concrete cover is specified in ACI 318-89 Section 7.7.1).[18] Chapter 43 of the Uniform Building Code states that reinforced concrete columns utilizing Grade A concrete (concrete made with aggregates such as limestone, calcareous gravel, expanded clay, shale, or others containing 40 percent or less quartz, chert, or flint) possess a four-hour rating with one and one-half inch cover. A four-hour rating is the maximum required for building structures.

Tables of fire resistance rating for various insulating materials and constructions applied to structural elements are published in various AISI booklets[19,20,21] and in publications of the Underwriters Laboratory, Inc.

Longitudinal Reinforcing Bar Arrangement

Composite columns can take on just about any shape for which a form can be made and stripped. They can be square, rectangular, round, triangular, or any other configuration, with just about any corresponding reinforcing bar arrangement common to concrete columns. For use in composite frame construction, however, square or rectangular columns

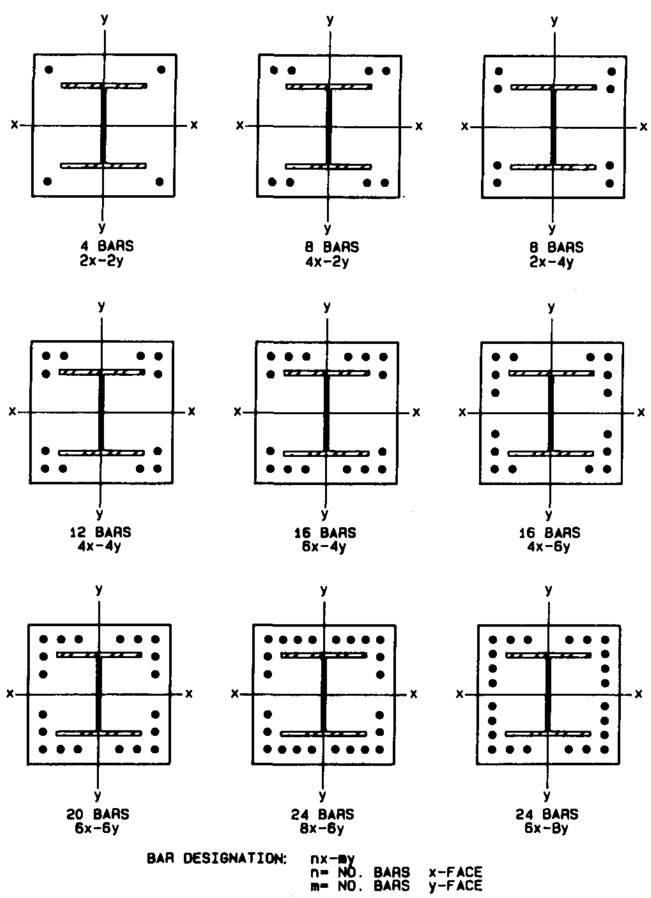

Fig. 2. Longitudinal bar arrangement in composite columns.

are the most practical shape, with bar arrangements tending to place the vertical reinforcing bars at or near the four corners of the column. Figure 2 shows preferred arrangements which allow spandrel beams and a perpendicular floor beam to frame into the encased steel shape without interrupting the continuous vertical bars. Such arrangements also generate the maximum design capacity for the column.

Although there are no explicit requirements for longitudinal bar spacing in the LRFD Specification, it is advisable to establish minimum limits so that concrete can flow readily in spaces between each bar and between bars and the encased steel shape.

Minimum spacing criteria will also prevent honeycombing and cracks caused by high bond stresses between bars. Past experience with reinforced concrete columns has shown that the requirements established by the ACI 318 Code have provided satisfactory performance. These spacing and cover requirements have been used in the formulation of this design aid and as diagramed in Fig. 3 and listed below:

1. Minimum concrete cover over vertical bars and ties shall be 1½-in. (LRFD Specification, Section I2.1.b).
2. Clear distance between longitudinal bars shall not be less than 1½ bar diameters or 1½-in. minimum (ACI 318-89 Section 7.6.3).

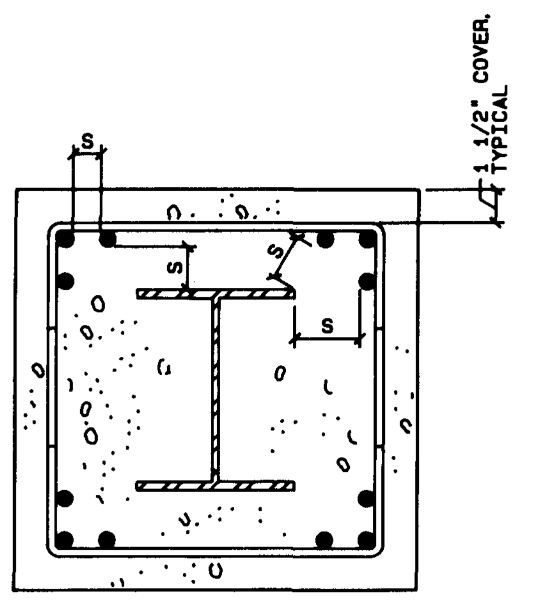

Fig. 3. Composite column cover and bar spacing requirements.

3. The clear distance limitations apply also to contact lap splices and adjacent bars (ACI 318-89 Section 7.6.4).
4. Clear distance between longitudinal bars and steel shape shall be 1½ bar diameters or 1½-in. minimum.

Ties

Reinforcing steel cages (longitudinal bars and ties) must usually be set after and around the steel column. Because the steel column is erected in an earlier erection sequence, only open U-shaped ties are suitable for composite columns. Ties are used to provide lateral stability of the longitudinal bars and confinement of the concrete. The requirements of the LRFD specification and certain requirements of the ACI 318-89 code not specifically addressed by the LRFD specification should be satisfied as follows:

1. The cross sectional area of the tie shall be at least 0.007 square inches per inch of tie spacing (LRFD Specification I2.1.b).
2. The spacing of the ties shall not be greater than two-thirds of the least dimension of the cross section (LRFD Specification I2.1.b).
3. The spacing of ties shall not be greater than 16 longitudinal bar diameters or 48 tie bar diameters (ACI 318-89 Section 7.10.5.1).
4. Ties shall be at least #4 in size for #11, #14, #18, and bundled longitudinal bars, and #3 in size for all other bars (ACI 318-89 Section 7.10.5.1).
5. Ties shall be arranged such that every corner and alternate bar shall have lateral support provided by a corner of a tie, with an inclusive angle of not more than 135° and no bar shall be further than 6 inches clear on each side along the tie from such a laterally supported bar (ACI 318-89 Section 7.10.5.3).
6. A lap splice of two pieces of an open tie shall be at least equal to 1.3 times the tensile development length for the specified yield strength (ACI 318-89 Section 12.13.5).

Suggested details for composite column ties are shown in Typical Details 1, 2, and 3 of Part 2.

Longitudinal Reinforcing Bar Splices

The requirements for splicing vertical longitudinal reinforcing bars for composite columns shall follow the same rules as apply for conventional reinforced concrete columns as specified in Chapter 12 of the ACI 318-89 Code. Several additional comments should be made for composite columns. First, additional vertical longitudinal restraining bars (LRFD Specification I2.1.b) should be used between the corners where the continuous load carrying bars are located in composite frame construction. These bars usually cannot be continuous because of interruption with intersecting framing members at the floor line. They are often required to satisfy the spacing requirements for vertical longitudinal bars shown as follows:

The cross section area of longitudinal reinforcement shall be at least equal to 0.007 square inches per inch of bar spacing (LRFD Specification I2.1.b).

Second, it is suggested that, in high rise composite frame construction, the vertical bar splices be located at the middle clear height of the composite column. This point is usually near the inflection point (zero moment) of the column where the more economical compression lap splices or compression butt splices may be used. The more expensive tension lap or tension butt splices may be required if splices are made at the floor line.

A suggested composite column splice detail is shown in Typical Detail 1 of Part 2.

Connection of Steel Beam to Encased Wide Flange

In composite frame construction, steel spandrel beams and/or perpendicular floor beams often frame into the composite column at the floor level. Sometimes these beams will be simply supported floor beams where conventional double-angle framed beam connections (LRFD Manual, Part 5) or single-plate shear connections may be utilized. More often, however, the steel spandrel beams will be part of the lateral load resisting system of the building and require a moment connection to the composite column. Practicality will often dictate that the larger spandrel beam (frequently a W36 in tall buildings) be continuous through the joint with the smaller erection column (often a small W14) interrupted and penetration welded to the flanges of the spandrel beam. To increase the speed of erection and minimize field welding, the spandrel beam and erection column are often prefabricated in the shop to form "tree columns" or "tree beams" with field connections at the mid-height of column and midspan of spandrel beam using high strength bolts. See Typical Detail 5, Part 2.

The engineer must concern himself with the transfer of forces from the floor beams to the composite column. For simply supported beams not part of the lateral frame, the simplest method to transfer the beam reaction to the composite column is through a standard double-angle or single-plate shear connection to the erection column. It is then necessary to provide a positive shear connection from the erection column to the concrete along the column length to ensure transfer of the beam reaction to the composite column cross section. The simplest method to accomplish this is by the use of standard headed shear connectors, preferably shop welded to the wide flange column. For moment connected spandrel beams, the beam shear and unbalanced moment must be transferred to the composite column cross section. Different transfer mechanisms have been tested at the University of Texas at Austin.[24]

Several suggested details are shown in Details 1 and 2 of Part 2.

Shear Connectors

As discussed in the previous section, it is necessary to provide a positive shear connection transfer from the floor beam to the encased steel column when the beam connection is made directly to the encased steel column. It is likely that a significant portion of this reaction can be transferred in bond between the encased section and the concrete as reported in Reference 14. An estimate of this value can be made from Equation 5 of Reference 16 which is based on the results of a limited number of push tests in which a steel column is encased in a concrete column.

$$P_{sl} = \frac{3.6 b_f (0.09 f_c' - 95)\, l_e}{k}$$

where

P_{sl} = allowable load for the encased shape, lb
b_f = steel flange width of encased shape, in.
f_c' = concrete compressive strength, psi
l_e = encased length of steel shape, in.
k = constant ≈ 5

Converting to an average ultimate bond stress "u," using only the flange surfaces as being effective and applying a safety factor of five as reported in the tests.

$$u = \frac{P_{sl} \times 5}{4 b_f l_e} = \frac{3.6 \times b_f (.09 f_c' - 95)\, l_e}{5} \times \frac{5}{4 b_f l_e}$$

$$u = 0.9\,(0.9 f_c' - 95), \text{ average ultimate bond stress, psi}$$

Consider a typical case of a W14x90 encased column in 5,000 psi concrete with a floor-to-floor height (h_o) of 13 feet. The average ultimate bond stress is

$$u = 0.9\,(0.09 \times 5{,}000 - 95) = 320 \text{ psi}$$

The ultimate shear force that could be transferred by bond is

$$= u \times h_o \times 4 b_f = \frac{320 \times (13 \times 12) \times (4 \times 14.5)}{1{,}000} = 2{,}895 \text{ kips}$$

These results indicate that typical floor reactions on the composite column could be easily transferred by bond alone.

The above discussion considered the case where axial load alone is transferred from the encased steel section to the concrete. For beam-columns where high bending moments may exist on the composite column, the need for shear connectors must also be evaluated. Until such time as research data is provided, the following simplistic evaluation may be made. Assume a situation where a composite column is part of a lateral load resisting frame with a point of inflection at mid-column height and a plastic neutral axis completely outside the steel cross section (similar to Fig. 4 except for plastic neutral axis location). An analogy can be made between this case and that of a composite beam where shear connectors are provided uniformly across the member length between the point of zero moment and maximum moment. The ultimate axial force to be transferred between the encased steel column and the concrete over the full column height is $2AF_y$ where A is the steel column area and F_y is its yield strength. Assuming a bond strength is available in this case similar to the case of the push test discussed above, then shear connectors would theoretically be required when $2AF_y$ is greater than the ultimate bond force. In the previous example, assume an A36 W14×90 erection column is used. Then,

$$2AF_y = 2 \times 26.5 \times 36 = 1{,}908 \text{ kips}$$

This is less than the available shear transfer from bond, which was calculated as 2,895 kips

Again, it is shown that bond stress alone can transfer the shear between the encased shape and the concrete, assuming no loss in bond occurs as a result of tensile cracking at high moments.

The composite beam-column design tables presented in Part A assume a nominal flexural strength based on the plastic stress distribution of the full composite cross section. To validate this assumption, the LRFD specification commentary in Section 14, requires a transfer of shear from the steel to the concrete with shear connectors. Therefore, until further research is conducted on the loss of bond between the encased steel section and the concrete, and until more comprehensive push tests are run, the following suggestions are made with regard to shear connectors on composite columns:

1. Provide shear connectors on the outside flanges where space permits. Where space does not permit, provide shear connectors on the inside flange staggered either side of the web.
2. Provide shear connectors in sufficient quantity, spaced uniformly along the encased column length and around the column cross section between floors, to carry the greater of the following minimum shear transfer forces as applicable:
   a. The sum of all beam reactions at the floor level.
   b. Whenever the ratio of the required axial strength to the factored nominal axial strength, $P_u / \phi_c P_n$, is less than 0.3, a force equal to F_y times the area of steel on the tensile side of the plastic neutral axis in order to sustain a moment equal to the nominal flexural strength of the composite cross section. The ratio 0.3 is used as an arbitrary value to distinguish a composite column subjected to predominantly axial load from one subjected to predominately moment. Consideration must be given to the fact that this moment is reversible.
3. The maximum spacing of shear connectors on each flange is suggested to be 32 inches.

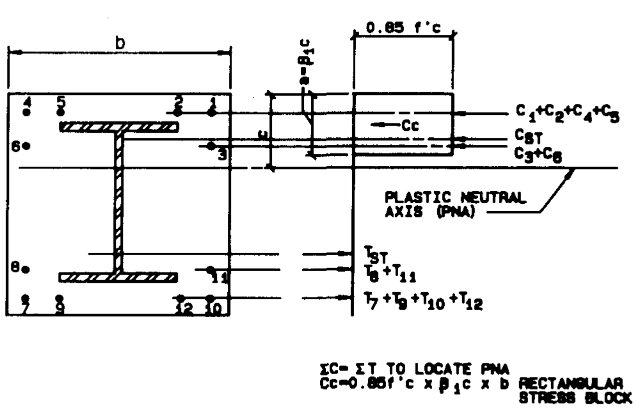

Fig. 4. Plastic stress distribution in composite columns.

If minimum shear connectors are provided according to the guidelines identified herein, it is reasonable to assume compatibility of strains between concrete and encased steel to permit higher strains than 0.0018 under axial load alone. This strain level has been identified in Reference 7 and LRFD Commentary, Section 12.1, as a point where unconfined concrete remains unspalled and stable. Therefore, a slight increase in the maximum usable value of reinforcing steel stress from 55 ksi, corresponding to 0.0018 axial strain, to 60 ksi, the yield point of ASTM A615 Grade 60 reinforcing steel, would seem to be justified. Such an approach has been adopted in this Guide. The use of shear connectors also allows the full plastic moment capacity to be counted upon when $P_u / (\phi_c M_n)$ is less than 0.3 (LRFD Commentary, I4) instead of the reduction specified in LRFD Specification, Section I4.

Suggested details for shear connectors on composite columns are shown in Typical Details 1 and 2 of Part 2.

Base Plate

Normally a base plate for the encased steel column of a composite column is specified to be the minimum dimension possible to accommodate the anchor bolts anchoring it to the foundation during the erection phase. In doing so, the base plate will interfere the least possible amount with dowels coming up from the foundation to splice with the longitudinal vertical bars of the composite column. The design engineer must provide dowels from the composite column to the foundation to transmit the column load in excess of the allowable bearing stress on the foundation concrete ($\phi_c \times 0.85 \times f_c'$) times the effective bearing area (the total composite column area less the area of the encased wide flange column base plate). In some cases, depending on the base plate size, it may be necessary to add additional foundation dowels to adequately transmit the load carried by the concrete of the composite column. A typical base plate detail is shown in Typical Detail 4, Part 2. A composite column base plate example is included as Example 5, Part 3.

Erection and Temporary Wind Bracing During Composite Frame Construction

Historically, a structural steel erector is accustomed to working with a steel framed structure that is stabilized as the frame is constructed with moment connections or permanent cross bracing. Composite frames many times are not stable and not fully able to carry lateral loads until after the concrete is poured and cured many floors behind. Because of this fact, it is incumbent on the engineer-of-record to state the assumptions of bare steel frame stability in the contract documents. Either he designs and details the necessary temporary bracing on the drawings or requires the erector to engage a structural engineer to provide it. The engineer-of-record is the most appropriate person to provide this service by virtue of his knowledge of the loads and familiarity with the overall structure. Additional discussions about the design responsibility of steel frames during erection may be found in the AISC Code of Standard Practice.[22] A discussion of composite frames during erection may be found in Reference 15.

Load and Resistance Factor Design (LRFD) of Composite Columns

To qualify as a composite column under the LRFD Specification design procedure, the following limitations must be satisfied as defined in Section 12.1:

1. The cross sectional area of the steel shape, pipe, or tubing must comprise at least four percent of the total composite cross section.
2. Concrete encasement of a steel core shall be reinforced with longitudinal load carrying bars, longitudinal bars to restrain concrete, and lateral ties. Longitudinal load carrying bars shall be continuous at framed levels; longitudinal restraining bars may be interrupted at framed levels. The spacing of ties shall be not greater than two-thirds of the least dimension of the composite cross section. The cross sectional area of the transverse and longitudinal reinforcement shall be at least 0.007 in.^{2} per inch of bar spacing. The encasement shall provide at least 1½-in. of clear cover outside of both transverse and longitudinal reinforcement.
3. Concrete shall have a specified compressive strength f_c' of not less than 3 ksi nor more than 8 ksi for normal weight concrete, and not less than 4 ksi for lightweight concrete.
4. The specified minimum yield stress of structural steel and reinforcing bars used in calculating the strength of a composite column shall not exceed 55 ksi.

The required design strength P_u of axially loaded composite columns is defined in the LRFD Specification, Section E2, with modification of certain terms according to Section I2.2. These rules are summarized as follows:

$P_u = \phi_c P_n$, required axial strength

$P_n = A_s F_{cr}$, nominal axial strength (E2-1 modified)

For $\lambda_c \leq 1.5$,

$$F_{cr} = (0.658^{\lambda_c^2}) F_{my} \quad \text{(E2-2 modified)}$$

For $\lambda_c > 1.5$,

$$F_{cr} = \frac{0.877}{\lambda_c^2} F_{my} \quad \text{(E2-3 modified)}$$

$$\lambda_c = \frac{Kl}{r_m \pi} (F_{my} / E_m)^{1/2} \quad \text{(E2-4 modified)}$$

ϕ_c = resistance factor for compression = 0.85
A_s = gross area of steel shape
F_{my} = modified yield stress
$= F_y + c_1 F_{yr} (A_r / A_s) + c_2 f_c' (A_c / A_s)$, ksi (I2-1)
E_m = modified modulus of elasticity
$= E + c_3 E_c (A_c / A_s)$, ksi (I2-2)
F_y = specified yield stress of structural steel column, ksi
E = modulus of elasticity of steel, ksi
K = effective length factor
l = unbraced length of column, in.
r_m = radius of gyration of steel shape in plane of buckling, except that it shall not be less than 0.3 times the overall thickness of the composite cross section in the plane of buckling, in.
A_c = net concrete area $= A_g - A_s - A_r$, in.^{2}
A_g = gross area of composite section, in.^{2}
A_r = area of longitudinal reinforcing bars, in.^{2}
E_c = modulus of elasticity of concrete $= w_c^{1.5} (f_c')^{1/2}$, ksi
w_c = unit weight of concrete, lbs./ft^3
f_c' = specified compressive strength of concrete, ksi
F_{yr} = specified minimum yield stress of longitudinal reinforcing bars, ksi
c_1 = 0.7
c_2 = 0.6
c_3 = 0.2

The interaction of axial compression and flexure in the plane of symmetry on composite members is defined in Section H1.1, H1.2, and I4 as follows:

For $P_u / \phi_c P_n \geq 0.2$,

$$\frac{P_u}{\phi_c P_n} + \frac{8}{9}\left(\frac{M_{ux}}{\phi_b M_{nx}} + \frac{M_{uy}}{\phi_b M_{ny}}\right) \leq 1.0 \quad \text{(H1-1a)}$$

For $P_u / \phi_c P_n < 0.2$,

$$\frac{P_u}{2\phi_c P_n} + \left(\frac{M_{ux}}{\phi_b M_{nx}} + \frac{M_{uy}}{\phi_b M_{ny}}\right) \leq 1.0 \quad \text{(H1-1b)}$$

P_u = required compressive strength, kips
P_n = nominal compressive strength, kips
M_u = required flexural strength, kip-in.
M_n = nominal flexural strength determined from plastic

stress distribution on the composite cross section, kip-in.

ϕ_c = resistance factor for compression = 0.85

ϕ_b = resistance factor for flexure = 0.90

The following information on the determination of the required flexural strength, M_u, is quoted from Section H1.2 of the LRFD Specification, with minor changes in symbols as prescribed in Section I2.

"In structures designed on the basis of elastic analysis, M_u may be determined from a second order elastic analysis using factored loads. In structures designed on the basis of plastic analysis, M_u shall be determined from a plastic analysis that satisfies the requirements of Sects. C1 and C2. In structures designed on the basis of elastic first order analysis the following procedure for the determination of M_u may be used in lieu of a second order analysis:

$$M_u = B_1 M_{nt} + B_2 M_{lt} \qquad \text{(H1-2)}$$

where

M_{nt} = required flexural strength in member assuming there is no lateral translation of the frame, kip-in.

M_{lt} = required flexural strength in member as a result of lateral translation of the frame only, kip-in.

$$B_1 = \frac{C_m}{(1 - P_u / P_e)} \geq \qquad \text{(H1-3)}$$

P_e = $A_s F_{my} / \lambda_c^2$ where λ_c is defined by Formula E2-4 with $K \leq 1.0$ in the plane of bending.

C_m = a coefficient whose value shall be taken as follows:

i. For restrained compression members in frames braced against joint translation and not subject to transverse loading between their supports in the plane of bending,

$$C_m = 0.6 - 0.4(M_1 / M_2) \qquad \text{(H1-4)}$$

where M_1 / M_2 is the ratio of the smaller to larger moments at the ends of that portion of the member unbraced in the plane of bending under consideration. M_1 / M_2 is positive when the member is bent in reverse curvature, negative when bent in single curvature.

ii. For compression members in frames braced against joint translation in the plane of loading and subjected to transverse loading between their supports, the value of C_m can be determined by rational analysis. In lieu of such analysis, the following values may be used:

for members whose ends are restrained, C_m = 0.85

for members whose ends are unrestrained, C_m = 1.0

$$B_2 = \frac{1}{1 - \Sigma P_u \left(\frac{\Delta_{oh}}{\Sigma HL} \right)} \qquad \text{(H1-5)}$$

or

$$B_2 = \frac{1}{1 - \frac{\Sigma P_u}{\Sigma P_e}} \qquad \text{(H1-6)}$$

ΣP_u = required axial load strength of all columns in a story, kips

Δ_{oh} = translation deflection of the story under consideration, in.

ΣH = sum of all story horizontal forces producing Δ_{oh}, kips

L = story height, in.

P_e = $A_s F_{my} / \lambda_c^2$, kips, where λ_c is the slenderness parameter defined by Formula E2-4, in which the effective length factor K in the plane of bending shall be determined in accordance with Sect. C2.2, but shall not be less than unity."

The nominal flexural strength M_n is determined for the plastic stress distribution on the composite cross section as shown in Fig. 4. The plastic neutral axis is first determined such that there is equilibrium of axial forces in the concrete, reinforcing steel and embedded steel column. The nominal flexural strength M_n is determined as the summation of the first moment of axial forces about the neutral axis. See Example 2, Part 3.

In the determination of the concrete compressive axial force, a concrete compressive stress of $0.85f'_c$ is assumed uniformly distributed over an equivalent stress block bounded by the edges of the cross section and a straight line parallel to the plastic neutral axis at a distance $a = \beta_1 c$, where c is the distance from the edge of the cross section to the plastic neutral axis, and,

$$\beta_1 = 0.85 \text{ for } f'_c \leq 4 \text{ ksi}$$

$$\beta_1 = 0.85 - 0.05(f'_c - 4) \geq 0.65 \text{ for } f'_c > 4 \text{ ksi}$$

These assumptions are contained in the ACI 318-89 Code (Section 10.2.7.3).

Comparison Between LRFD and Strain Compatibility Methods

Guidelines for the design of composite columns were first introduced into the ACI Building Code in 1971 (ACI 318-71). With the widespread use and popularity of composite columns in the 1970s and 1980s, many engineers designed composite columns according to these principles, which are essentially the same ones used for conventional reinforced concrete columns.

The current rules for designing composite columns by the

ACI approach are found in ACI 318-89, Chapter 10. The method essentially is one based on the assumption of a linear strain diagram across the composite cross section with the maximum failure strain at ultimate load defined as 0.003. With these assumptions, it is possible to generate strength capacities of the cross section for successive assumed locations of the neutral axis. Strains at each location of the cross section are converted to stress for the usual assumption of a linear stress-strain curve for reinforcing steel and structural steel. The first moment of forces in each element of concrete, structural steel, and reinforcing steel is taken about the neutral axis to generate a point (axial load and moment) on an interaction curve.

A comparison between the strain compatibility approach and the LRFD approach is shown in Figs. 5 through 7. Interaction curves (axial load vs. moment) are plotted covering the wide range of composite column sizes (28×28 in., 36×36 in., 48×48 in.) steel column sizes (minimum of four percent of the composite column cross section to maximum W14×730) and reinforcing steel percentages (one percent to four percent) that are likely to be found in practice. Examination of these figures reveals the following comparison:

1. The ACI approach yields curves that are parabolic in nature while the AISC curves are essentially bilinear.
2. The two methods yield pure moment capacities that are very close to each other. The maximum difference is approximately 15 percent with most values much closer than that. LRFD in all cases predicts higher moment values.
3. The two methods yield pure axial load capacities that are reasonably close when the steel column constitutes a small part of the total column capacity, but are significantly different as the steel column becomes larger. With larger steel column sizes, the LRFD approach yields axial capacities as much as 30 percent larger than ACI. This comparison, however, is not very meaningful because the ACI approach essentially does not recognize pure axially loaded columns with its minimum eccentricity provisions.
4. Large differences in capacity are predicted (as much as 50 percent) for composite columns having small steel columns. The ACI method yields significantly larger axial loads for a given moment than the LRFD method. This difference is most striking in the intermediate range of the curve.
5. With larger steel columns, the LRFD curve is mostly above (predicts higher values) the ACI curve. As the steel column section becomes lighter, the ACI curve tends to be above the LRFD curve, particularly in the middle ranges of eccentricity.
6. It can generally be stated that, as the steel column becomes a larger portion of the total column capacity, design economy can be realized by designing using the LRFD approach. When the steel column becomes

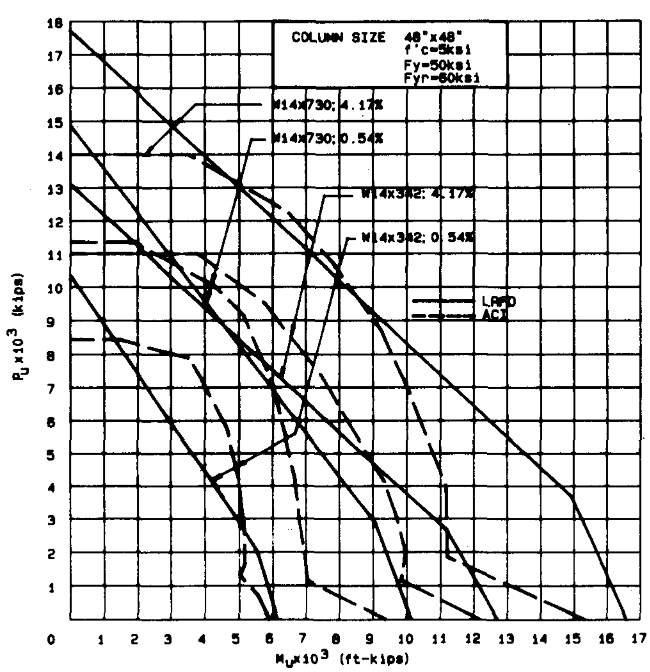

Fig. 5. Interaction curve comparisons ACI vs. LRFD.

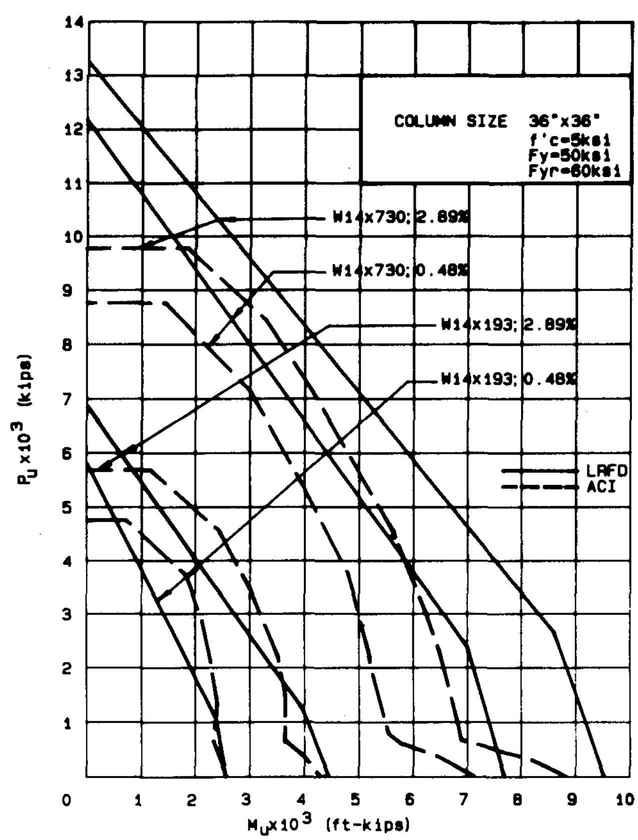

Fig. 6. Interaction curve comparisons ACI vs. LRFD.

smaller (the column is more like a conventional concrete column), the ACI method is more economical in design.

Reference 23 also presents a comparison of design methods.

Description of the Composite Beam-Column Load Tables

Design tables are presented in Part 4 of this Guide to assist the engineer in the rapid selection of the most economical composite column to resist factored values of axial load and moment. The tables are based on the LRFD Specification requirements outlined in the previous sections. The tables have been set up to follow the general format of the LRFD Manual,[4] including the column tables in Part 2 (Axial Loaded Steel Columns) and Part 4 (Axially Loaded Composite Columns) of the Manual, because these are already familiar to most design engineers. The tables indicate the following parameters from which the engineer can select a design (Refer to sample table at beginning of Part 4 of this Guide):

Item 1: Composite Column Size ($b \times h$, in.). The composite column size ($b \times h$) is indicated in inches in the upper right comer of the table. Note that the x- x axis is always the strong axis of the steel column and is in the direction of b. The y-y axis is always the weak axis of the steel column and is in the direction of h. The table covers square and rectangular sizes varying from 16 inches to 36 inches in four-inch increments.

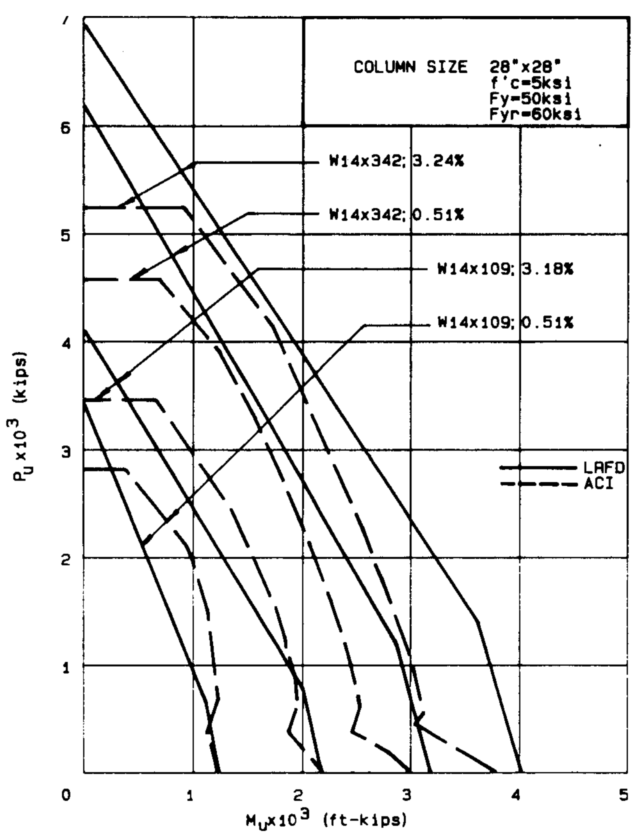

Fig. 7. Interaction curve comparisons ACI vs. LRFD.

Item 2: Concrete Strength (f'_c, ksi). Concrete compression strength (f'_c) is indicated in the top right corner for 3 and 8 ksi. All concrete is assumed to be normal weight concrete weighing 145 pcf. Linear interpolation can be used for concrete strengths between 3 and 8 ksi.

Item 3: Reinforcing Bar Yield Strength (F_{yr}, ksi). All longitudinal and transverse reinforcing steel in the table is based on ASTM A615 Grade 60 reinforcing steel.

Item 4: Steel Column Size. Steel column size is listed across the top of the table. Sizes tabulated include all W8, W10, W12, and W14 wide flange shapes that are listed in the steel column tables in Part 4 of the LRFD manual. They include W8 (35 to 67), W10 (39 to 112), W12 (50 to 336), and W14 (43 to 426).

Item 5: Steel Grade (F_y, ksi). Steel grade is presented across the top of the page for both A36 and Grade 50 steel.

Item 6: Reinforcement. Information on column reinforcement is indicated in the extreme left column and includes the percentage of vertical steel, area of steel (A_r, in.^{2}) number, size of bar, pattern of vertical steel, and lateral tie size and spacing (see Fig. 2 for notation). The table covers steel percentages as close as practical to 0.5 percent, 1 percent, 2 percent, 3 percent, and 4 percent steel. If zeroes are tabulated, it indicates steel cover or spacing requirements could not be satisfied for the steel percentage indicated. Bar arrangements and their designations are shown in Fig. 2.

Item 7: Unbraced Length (KL, ft). Axial load capacities are tabulated for unbraced lengths of 0, 11, 13, 17, 21, 25, and 40 feet.

Item 8: Axial Design Strength (Nominal Axial Strength times Resistance Factor, $\phi_c P_n$, kips). For each unbraced length, KL, equations E2-1, E2-2, E2-3, and E2-4 are used to calculate the nominal axial strength which is multiplied by $\phi_c = 0.85$ and tabulated in the column marked 8.

Item 9, 10, and 11: Available Required Flexural Strength (Uniaxial Moment Capacity, M_{ux}, M_{uy}, ft-kips). For each ratio of applied factored axial load to ϕ_c times the nominal axial capacity, $P_u / \phi P_n$, available uniaxial moment capacity is tabulated by solving equation H1-1a or H1-1b as applicable. *Note that these moment capacities are uniaxial capacities and are applied independently. Biaxial moment capacities are not tabulated.*

Item 12: Euler Buckling Term (C_{ex}, C_{ey}, kip-ft^2). The second order moment, M_u, can be taken directly from a second order elastic analysis, or it can be calculated from a first order elastic analysis by using LRFD equations H1-1 through H1-6. To aid the designer in such a calculation, the terms C_{ex} and C_{ey} are tabulated for each column configuration. The following definitions apply.

$$C_{ex} = \frac{P_{ex}(K_x L_x)^2}{10{,}000} \quad C_{ey} = \frac{P_{ey}(K_y L_y)^2}{10{,}000}$$

Thus, the Euler buckling load needed for the calculation is simply

$$P_e = 10{,}000 C_e / (KL)^2$$

Item 13: Radius of Gyration (r_{mx}, r_{my}, in.). To compare the axial design strength for buckling about each axis, and to assist the designer in determining column capacity for unbraced lengths not shown in the table, values of r_{mx} and r_{my} are tabulated for each column configuration.

Note that the development of the moment capacities listed in the tables is based on a numerical calculation of the contribution of the encased shape, the precise number and location of reinforcing bars as prescribed in the bar arrangements of Fig. 2, and the concrete. This is in lieu of the approximate plastic moment capacity expression prescribed by the LRFD Commentary equation C-I4-1. The approximate expression was used in the moment capacities tabulated in the composite column tables presently in the LRFD Manual and will result in some differences when compared to the more precise method used in the new composite beam-column tables in this Guide.

The following factors should be considered in the use of the tables:

1. Where zeroes exist in the tables, no bar pattern from the configurations considered in Fig. 2 exists that would satisfy bar cover and spacing requirements between bars, or between bars and the surface of the encased steel column (Refer to Fig. 3).
2. Moment capacity tabulated is the uniaxial moment capacity considering each axis separately.
3. Only column configurations conforming to all the limitations in the LRFD Specification (Section I2.1) are tabulated.
4. Capacities shown are only applicable to the bar arrangements shown in Fig. 2.
5. The designer must determine in each case that necessary clearances are available for beams framing into the steel column without interrupting the vertical bars.
6. Linear interpolation can be used to determine table values for concrete strengths between 3 and 8 ksi.

Specific instruction for using the tables are given at the beginning of the tables, Part 4 of this Guide. The background for the development of the tables is presented in Examples 1 and 2, Part 3 of this Guide.

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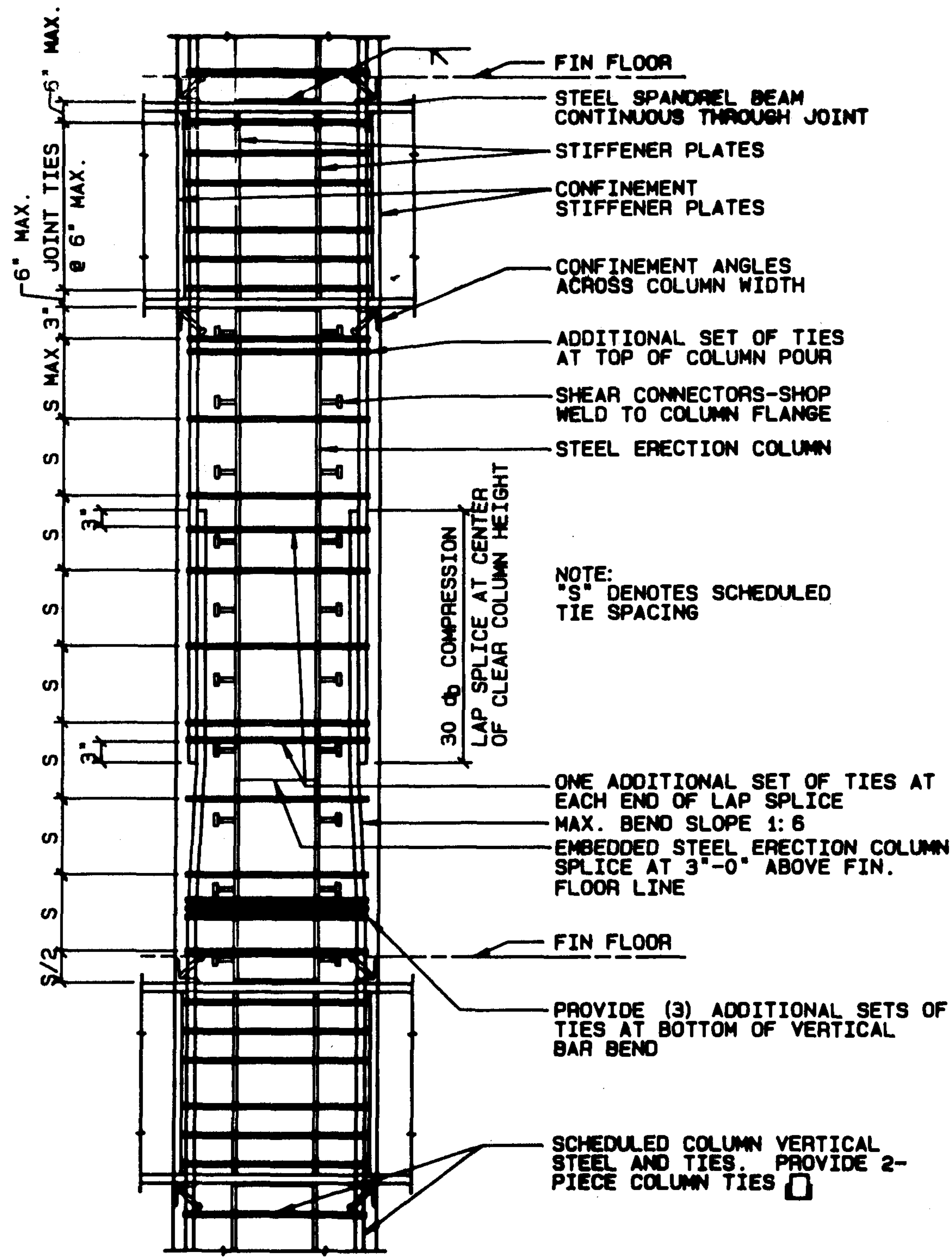
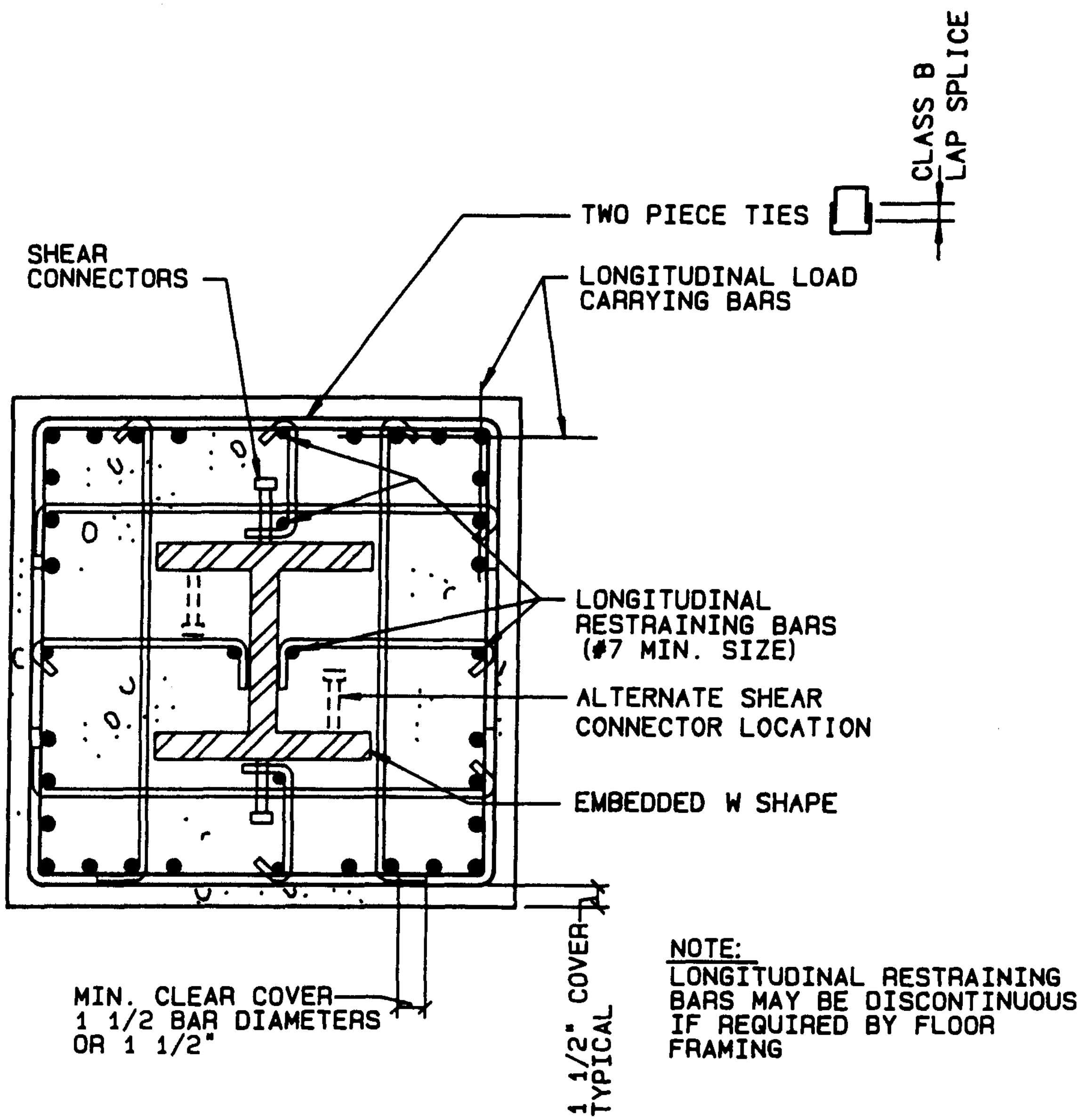
NOMENCLATURE

A_1 = Area of base plate, in.^{2}
A_2 = Full cross sectional area of concrete support, in.^{2}
A_c = Net concrete area, in.^{2}
A_g = Gross area of composite section, in.^{2}
A_H = Area of H-shaped portion of base plate, in.^{2}
A_r = Area of reinforcing bars, in.^{2}
A_s = Gross area of steel shape, in.^{2}
B = Base plate width, in.
B_1 B_2 = Factors used in determining M_u for combined bending and axial forces when first order analysis is employed
C = Compression force in reinforcing bar, kips
C_c = Compressive force in concrete, kips
C_e = Factor for calculating Euler buckling strength, kip-ft^2
C_m = Coefficient applied to bending term in interaction formula
E = Modulus of elasticity of steel (29,000 ksi)
E_c = Modulus of elasticity of concrete, ksi
E_m = Modified modulus of elasticity, ksi
F_{cr} = Critical stress, ksi
F_{my} = Modified yield stress, ksi
F_y = Specified minimum yield stress of the type of steel being used, ksi
F_{yr} = Specified minimum yield stress of reinforcing bars, ksi
H = Horizontal force, kips
K = Effective length factor for prismatic member
L = Unbraced length of member measured between the center of gravity of the bracing members, in.
L = Story height, in.
M_1 = Smaller moment at end of unbraced length of beam column, kip-in.
M_2 = Larger moment at end of unbraced length of beam column, kip-in.
M_{lt} = Required flexural strength in member due to lateral frame translation, kip-in.
M_n = Nominal flexural strength, kip-in.
M_{nt} = Required flexural strength in member assuming there is no lateral translation of the frame, kip-in.
M_u = Required flexural strength, kip-in.
N = Base plate length, in.
P_e = Euler buckling strength, kips
P_n = Nominal axial strength, kips
P_o = Factored load contributory to area enclosed by steel shape, kips
P_s = Factored axial load resisted by steel shape, kips
P_{sl} = Service load for encased shape limited by bond stress, lbs
P_u = Required axial strength, kips
R_u = Ratio of required axial strength to factored nominal axial strength
T = Tension force in reinforcing bar, kips
T_{ST} = Tension force in steel shape, kips
a = Depth of compression block of concrete in composite column, in.
b = Overall width of composite column, in.
b_f = Flange width, in.
c = Distance to outer fiber from plastic neutral axis, in.
c_1, c_2, c_3 = Numerical coefficients for calculating modified properties
d = Overall depth of member, in.
f_c' = Concrete compressive stress, psi or ksi, as applicable
h = Overall depth of composite column, in.
h_o = Floor-to-floor height, ft
k = Factor in bond strength calculation
l = Unbraced length of column, in.
l_e = Encased length of steel shape, in.
m = Cantilever distance in base plate analysis, in.
n = Cantilever distance in base plate analysis, in.
r = Radius of gyration, in.
r_m = Radius of gyration of steel shape in composite column, in.
s = Spacing (clear distance), in.
t_f = Flange thickness, in.
t_p = Thickness of base plate, in.
t_w = Web thickness, in.
w_c = Unit weight of concrete, lbs/ft^3
β_1 = Factor for determining depth of concrete in compression
Δ_{oh} = Translation deflection of story, in.
λ_c = Column slenderness parameter
ϕ_b = Resistance factor for flexure
ϕ_c = Resistance factor for axially loaded composite column

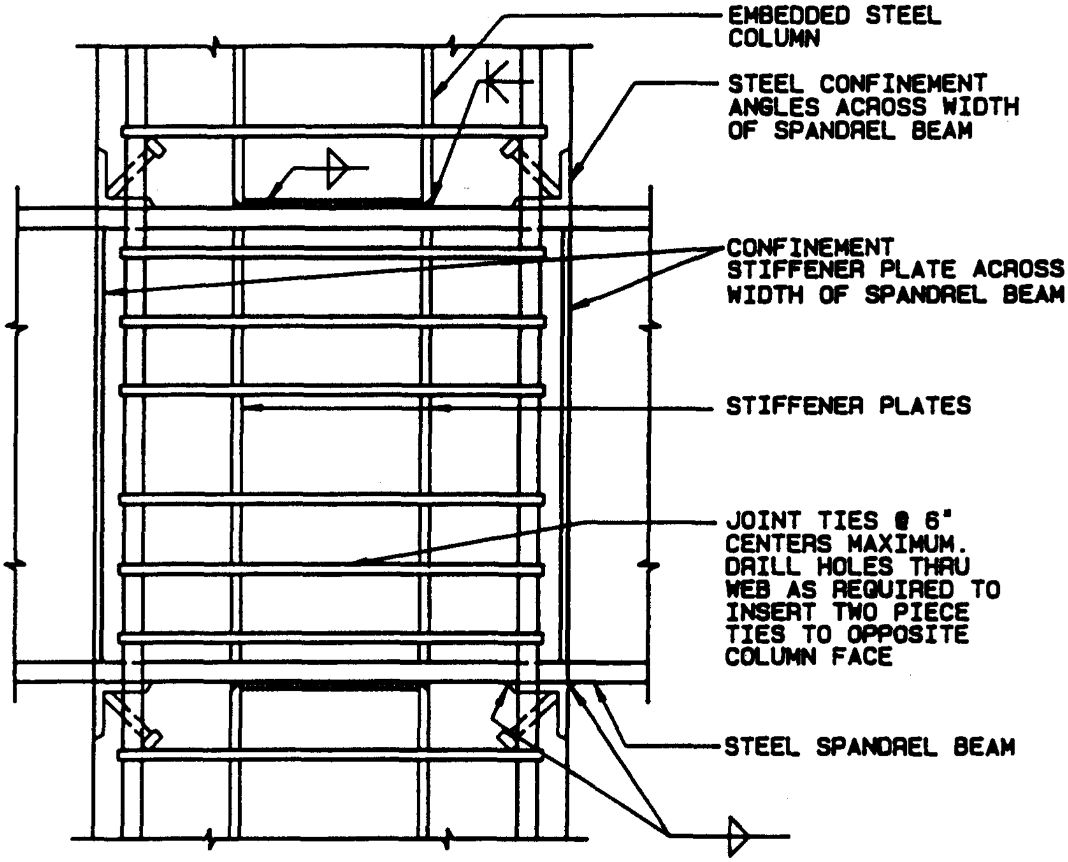
PART 2: SUGGESTED DETAILS FOR COMPOSITE COLUMNS



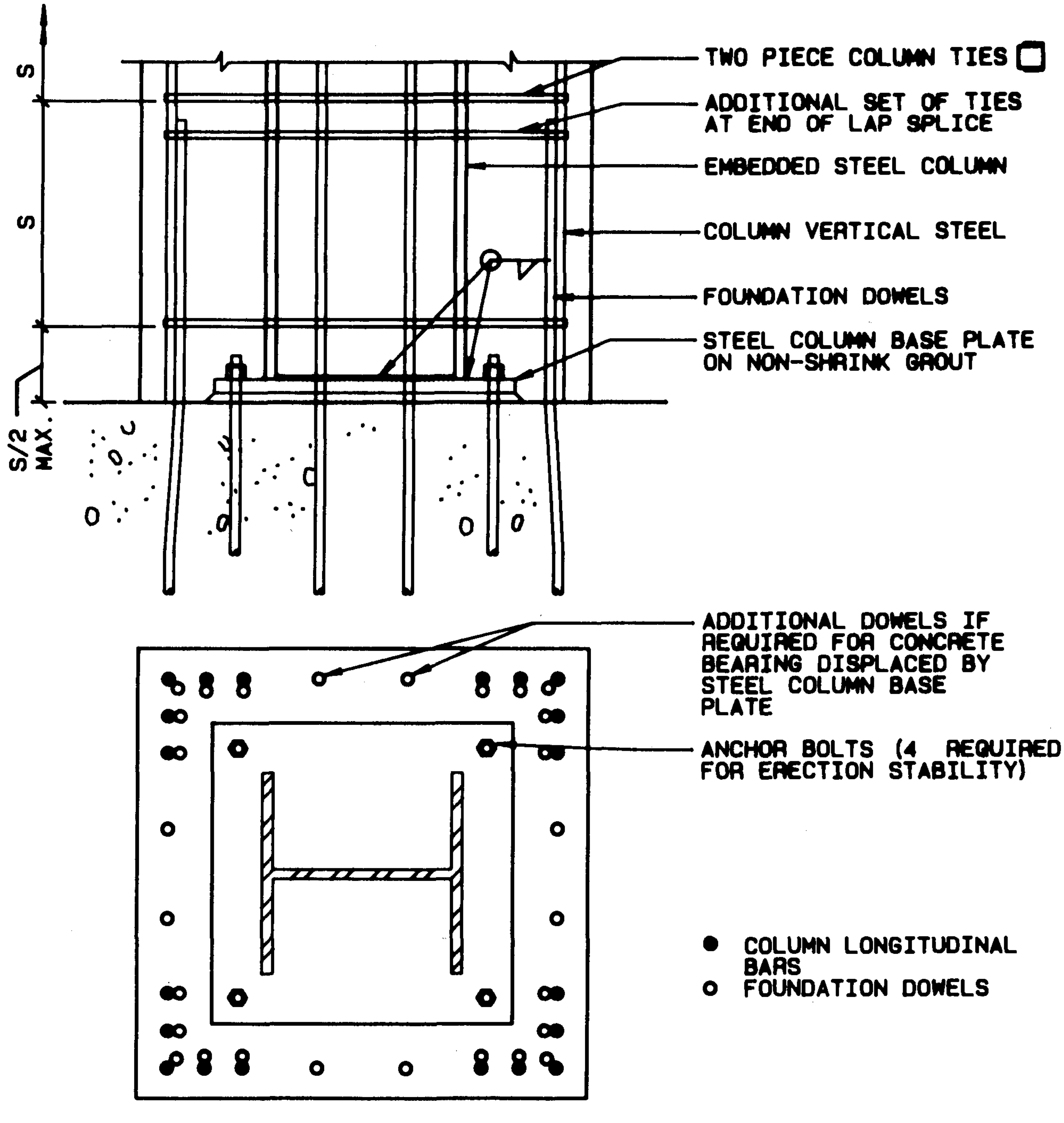
Typical Detail 1: Composite column elevation.



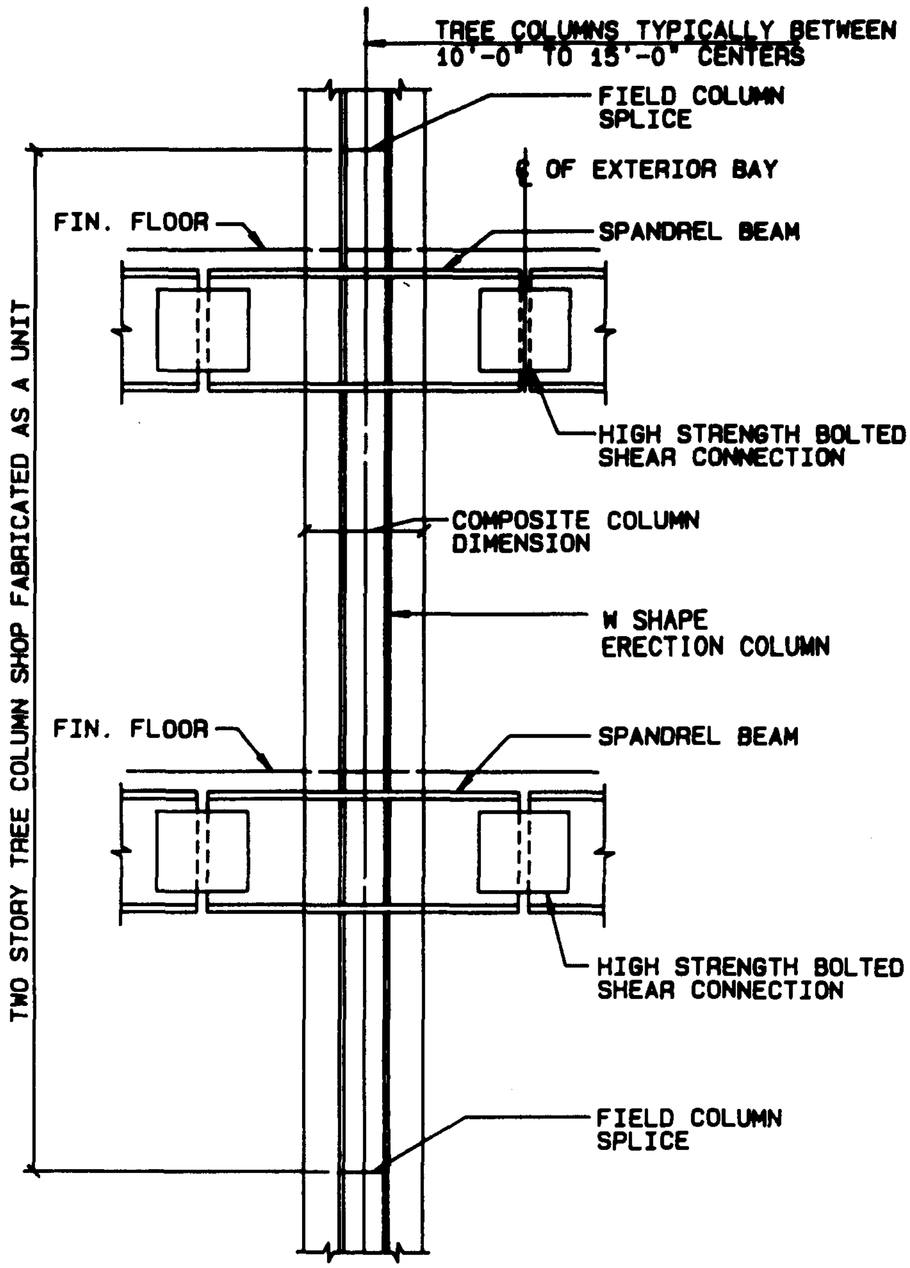
Typical Detail 2: Composite column cross section.



Typical Detail 3: Composite column joint.



Typical Detail 4: Composite column baseplate.



Typical Detail 5: Tree column in a composite frame.

PART 3: DESIGN EXAMPLES

Example 1:

Compute the axial load capacity of a 48×48-in. composite column with an encased W14×730. Compute capacity for unbraced length equal to 11'-0 and 40'-0. Use $f_c' = 5$ ksi, $F_{yr} = 60$ ksi, 20 - #14 (6*x* - 6y) and $w_c = 145$ pcf. See Fig. B-1.

W14×730 properties are:

$A_s = 215$ in.^{2}
$d = 22.42$ in.
$t_w = 3.07$ in.
$b_f = 17.89$ in.
$t_f = 4.91$ in.
$r_x = 8.17$ in.
$r_y = 4.69$ in.

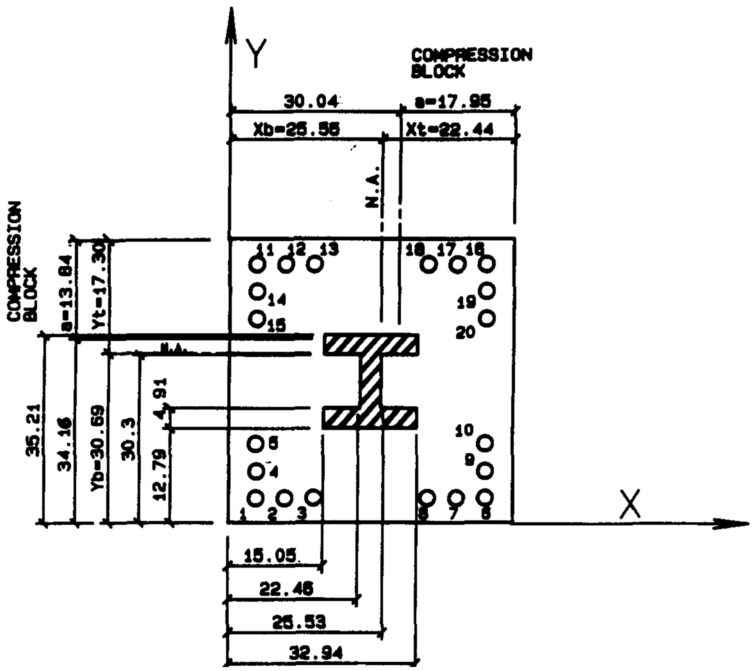


Fig. B-1. Cross section for Examples 1 and 2.

Solution:

1. Compute section properties.

Total area of longitudinal reinforcing bars = 20 × 2.25 = 45.0 in.^{2}

Gross section area of concrete column = 48 × 48 = 2,304 in.^{2}

Percentage of longitudinal reinforcing bars = 45.0 / 2,340 = 1.95 percent

Percentage of steel shape = 2157 2,304 = 9.33 percent > 4 percent **o.k.**

Net area of concrete = 2,304 - 45 - 215 = 2,044 in.^{2}

$F_{my} = F_y + (c_1 \times F_{yr} \times A_r / A_s) + (c_2 \times f_c' \times A_c / A_s)$

(Use F_{yr} = 60 ksi instead of 55 ksi limitations—see discussion under "Shear Connections")

$= 50 + (0.7 \times 60 \times 45 / 215) + (0.6 \times 5 \times 2{,}044 / 215)$

$= 87.31$ ksi

$E_c = w_c^{1.5} \times f_c'^{\,0.5} = 145^{1.5} \times 5^{0.5} = 3{,}904$ ksi

$E_m = E_s + (c_3 \times E_c \times A_c / A_s)$

$= 29{,}000 + (0.2 \times 3{,}904 \times 2{,}044 / 215) = 36{,}423$ ksi

Table A

COMPOSITE BEAM—COLUMN DESIGN CAPACITY — LRFD

$\phi_c = 0.85$ f_c': 5.0 ksi NW
$\phi_b = 0.90$ F_{yr}: 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size (b x h): 48 x 48

Designation		W14x730								W14x665							
F_y (ksi)		36				50				36				50			
Reinf.	KL	$\phi_c P_n$	$P_u/(\phi_c P_n)$	M_{ux}	M_{uy}	$\phi_c P_n$	$P_u/(\phi_c P_n)$	M_{ux}	M_{uy}	$\phi_c P_n$	$P_u/(\phi_c P_n)$	M_{ux}	M_{uy}	$\phi_c P_n$	$P_u/(\phi_c P_n)$	M_{ux}	M_{uy}
.54%	0	12300	0.0	8170	6960	14900	0.0	10100	7970	11800	0.0	7650	6680	14100	0.0	9370	7630
A_r (in.^{2})	11	12200	0.2	7350	6260	14800	0.2	9080	7170	11700	0.2	6880	6010	14000	0.2	8440	6860
= 12.48	13	12200	0.3	6430	5480	14700	0.3	7950	6270	11700	0.3	6020	5260	14000	0.3	7380	6010
	17	12100	0.4	5510	4700	14600	0.4	6810	5380	11600	0.4	5160	4510	13800	0.4	6330	5150
8-#11	21	12000	0.5	4590	3910	14500	0.5	5680	4480	11500	0.5	4300	3760	13700	0.5	5270	4290
$4x-2y$	25	11900	0.7	2760	2350	14300	0.7	3410	2690	11400	0.7	2580	2260	13500	0.7	3160	2570
	40	11300	0.9	918	782	13400	0.9	1140	896	10800	0.9	860	751	12700	0.9	1050	857
#4 Ties		C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}
@28 in		11200	11200	14.40	14.40	11200	11200	14.40	14.40	10400	10400	14.40	14.40	10400	10400	14.40	14.40
1.04%	0	12700	0.0	9110	7740	15300	0.0	11000	8750	12200	0.0	8590	7470	14500	0.0	10300	8410
A_r (in.^{2})	11	12600	0.2	8200	6970	15100	0.2	9930	7870	12100	0.2	7730	6720	14400	0.2	9280	7570
= 24.00	13	12600	0.3	7170	6090	15100	0.3	8690	6890	12100	0.3	6760	5880	14300	0.3	8120	6620
	17	12500	0.4	6150	5220	15000	0.4	7440	5900	12000	0.4	5800	5040	14200	0.4	6960	5670
24-#9	21	12400	0.5	5120	4350	14800	0.5	6200	4920	11900	0.5	4830	4200	14100	0.5	5800	4730
$8x-6y$	25	12300	0.7	3070	2610	14600	0.7	3720	2950	11700	0.7	2900	2520	13900	0.7	3480	2840
	40	11600	0.9	1020	870	13700	0.9	1240	983	11100	0.9	966	840	13000	0.9	1160	945
#3 Ties		C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}
@15 in		11200	11200	14.40	14.40	11200	11200	14.40	14.40	10400	10400	14.40	14.40	10400	10400	14.40	14.40
1.95%	0	13400	0.0	10700	9550	16000	0.0	12600	10600	12900	0.0	10200	9280	15200	0.0	11900	10200
A_r (in.^{2})	11	13300	0.2	9620	8600	15800	0.2	11300	9500	12800	0.2	9150	8350	15100	0.2	10700	9190
= 45.00	13	13300	0.3	8420	7520	15800	0.3	9930	8310	12700	0.3	8010	7310	15000	0.3	9370	8040
	17	13200	0.4	7220	6450	15600	0.4	8510	7120	12600	0.4	6860	6260	14900	0.4	8030	6900
20-#14	21	13100	0.5	6010	5370	15500	0.5	7090	5940	12500	0.5	5720	5220	14700	0.5	6690	5750
$6x-6y$	25	12900	0.7	3610	3220	15300	0.7	4260	3560	12400	0.7	3430	3130	14500	0.7	4010	3450
	40	12200	0.9	1200	1070	14300	0.9	1420	1190	11700	0.9	1140	1040	13600	0.9	1340	1150
#4 Ties		C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}
@28 in		11100	11100	14.40	14.40	11100	11100	14.40	14.40	10400	10400	14.40	14.40	10400	10400	14.40	14.40
2.78%	0	14000	0.0	12500	10500	16600	0.0	14400	11500	13500	0.0	12000	10300	15800	0.0	13700	11200
A_r (in.^{2})	11	13900	0.2	11200	9490	16400	0.2	13000	10400	13400	0.2	10800	9250	15700	0.2	12300	10100
= 64.00	13	13900	0.3	9830	8310	16400	0.3	11300	9090	13300	0.3	9420	8090	15600	0.3	10800	8830
	17	13800	0.4	8430	7120	16200	0.4	9720	7790	13200	0.4	8080	6940	15500	0.4	9240	7570
16-#18	21	13600	0.5	7020	5930	16100	0.5	8100	6490	13100	0.5	6730	5780	15300	0.5	7700	6310
$6x-4y$	25	13500	0.7	4210	3560	15800	0.7	4860	3900	13000	0.7	4040	3470	15100	0.7	4620	3780
	40	12700	0.9	1400	1190	14700	0.9	1620	1300	12200	0.9	1350	1160	14000	0.9	1540	1260
#4 Ties		C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}
(5)28 in		11100	11100	14.40	14.40	11100	11100	14.40	14.40	10300	10300	14.40	14.40	10300	10300	14.40	14.40
4.17%	0	15100	0.0	14600	12300	17600	0.0	16600	13300	14600	0.0	14100	12000	16900	0.0	15800	12900
A_r (in.^{2})	11	15000	0.2	13200	11100	17500	0.2	14900	12000	14400	0.2	12700	10800	16700	0.2	14300	11700
= 96.00	13	14900	0.3	11500	9680	17400	0.3	13000	10500	14400	0.3	11100	9470	16700	0.3	12500	10200
	17	14800	0.4	9880	8300	17300	0.4	11200	8970	14300	0.4	9530	8110	16500	0.4	10700	8740
24-#18	21	14700	0.5	8240	6910	17100	0.5	9310	7470	14100	0.5	7940	6760	16300	0.5	8910	7280
$8x-6y$	25	14500	0.7	4940	4150	16800	0.7	5590	4480	13900	0.7	4770	4060	16100	0.7	5350	4370
	40	13600	0.9	1650	1380	15600	0.9	1860	1490	13000	0.9	1590	1350	14800	0.9	1780	1460
#4 Ties		C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}
@28 in		11100	11100	14.40	14.40	11100	11100	14.40	14.40	10300	10300	14.40	14.40	10300	10300	14.40	14.40

Notes: 1. $C_{ex} = P_{ex}(K_xL_x)^2/10{,}000$ (kip-ft^2), $C_{ey} = P_{ey}(K_yL_y)^2/10{,}000$ (kip-ft^2), KL in ft, r_{mx} and r_{my} in inches.

2. Zeroes in columns for $\phi_c P_n$, M_{ux}, and M_{uy} indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 lor definition of bar arrangement (roc - my). NW = normal weight concrete.

4. $M_{ux} = \phi_b M_{nx}$ and $M_{uy} = \phi_b M_{ny}$ when $P_u/(\phi_c P_n) = 0.0$

$r_{mx} = r_{my} = 0.3 \times 48 = 14.4 \text{ in.} > r_x = 8.17 \text{ in.}$

$C_{ex} = C_{ey} = P_{ex} \times KL^2 / 10{,}000 = A_s \times E_m(\pi r_{mx})^2 / 1{,}440{,}000$

$= 215 \times 36{,}423 \times (3.1416 \times 14.4)^2 / 1{,}440{,}000$

$= 11{,}130 \text{ kip-ft}^2$

2. Axial load capacity

For KL = O'-O

$F_{cr} = F_{my} = 87.31 \text{ ksi}$

$\phi P_n = \phi A_s F_{cr} = 0.85 \times 215 \times 87.31 = 15{,}960 \text{ kips}$

For KL=11'-0

$\lambda_c = KL(F_{my} / E_m)^{0.5} / r_m / \pi$

$= KL(87.31 / 36.423)^{0.5} / 14.4 / 3.1416 = 0.001082KL$

$= 11 \times 12 \times 0.001082 = 0.143 < 1.5$

$F_{cr} = 0.658^{\lambda_c^2} \times F_{my} = 0.658^{(0.143 \times 0.143)} \times 87.31 = 86.57 \text{ ksi}$

$\phi P_n = \phi A_s F_{cr} = 0.85 \times 215 \times 86.57 = 15{,}820 \text{ kips}$

For KL = 40'-0

$\lambda_c = 0.001082KL = 40 \times 12 \times 0.001082 = 0.520 < 1.5$

$F_{cr} = 0.658^{(0.520 \times 0.520)} \times 87.31 = 78.0 \text{ ksi}$

$\phi P_n = \phi A_s F_{cr} = 0.85 \times 215 \times 78.0 = 14{,}250 \text{ kips}$

The calculated values of ϕP_n agree with the values circled in Table A, Example 2, which have been rounded.

Example 2:

Compute the interaction curves of the composite column described in Example 1. See Fig. B-1.

Solution:

1. Coordinates of reinforcing bars.

No.	x	y	No.	x	y
1	2.846	2.846	11	2.846	45.154
2	7.079	2.846	12	7.079	45.154
3	11.312	2.846	13	11.312	45.154
4	2.846	7.079	14	2.846	40.921
5	2.846	11.312	15	2.846	36.688
6	45.154	2.846	16	45.154	45.154
7	40.921	2.846	17	40.921	45.154
8	36.688	2.846	18	36.688	45.154
9	45.154	7.079	19	45.154	40.921
10	45.154	11.312	20	45.154	36.688

2. Nominal flexural strength about x-axis.

$$fc85 = 0.85f_c' = 0.85 \times 5 = 4.25$$

$$Fy85 = F_y - fc85 = 50 - 4.25 = 45.75$$

$$Fyr85 = F_{yr} - fc85 = 60 - 4.25 = 55.75$$

$$\beta_1 = 0.85 - 0.05\,(f_c' - 4) = 0.80$$

In general, successive approximations are required to determine the location of the plastic neutral axis. Here, trial values of the distance from the plastic neutral axis to the bottom of the section, Y_b, and to the top of the section, Y_a, are assumed as follows:

$$Y_b = 30.69 \text{ in.}$$

$$Y_t = 48 - Y_b = 48 - 30.69 = 17.31 \text{ in.}$$

$$a = \beta_1 Y_t = 0.8 \times 17.31 = 13.85 \text{ in.}$$

$$Y_a = 48 - a = 48 - 13.85 = 34.15 \text{ in.}$$

	Force (kips)	$y\text{-}Y_b$ (in.)	Moment (ft-kips)
Concrete			
4.25 × 48 × 13.8445	2824.28	10.3834	2443.80
Rebars			
1. -60 × 2.25	-135.0	-27.8484	313.29
2. -60 × 2.25	-135.0	-27.8484	313.29
3. -60 × 2.25	-135.0	-27.8484	313.29
4. -60 × 2.25	-135.0	-23.6154	265.67
5. -60 × 2.25	-135.0	-19.3824	218.05
6. -60 × 2.25	-135.0	-27.8484	313.29
7. -60 × 2.25	-135.0	-27.8484	313.29
8. -60 × 2.25	-135.0	-27.8484	313.29
9. -60 × 2.25	-135.0	-23.6154	265.67
10. -60 × 2.25	-135.0	-19.3824	218.05
11. 55.75 × 2.25	125.4375	14.4596	151.15
12. 55.75 × 2.25	125.4375	14.4596	151.15
13. 55.75 × 2.25	125.4375	14.4596	151.15
14. 55.75 × 2.25	125.4375	10.2266	106.90
15. 55.75 × 2.25	125.4375	5.9936	62.65
16. 55.75 × 2.25	125.4375	14.4596	151.15
17. 55.75 × 2.25	125.4375	14.4596	151.15
18. 55.75 × 2.25	125.4375	14.4596	151.15
19. 55.75 × 2.25	125.4375	10.2266	106.90
20. 55.75 × 2.25	125.4375	5.9936	62.65
Subtotal	-95.625		4093.18
Steel			
(50 - 0.85 × 5)(35.21 - 34.1555) × 17.89	863.07	3.9884	286.86
50 × (34.1555 - 30.6944) × 17.89	3095.95	1.7306	446.49
-50 × (30.6944 - 30.3) × 17.89	-352.79	-0.1972	5.80
-50 × (30.3-17.7) × 3.07	-1934.10	-6.6944	1078.97
-50 × 4.91 × 17.89	-4392.00	-15.4494	5654.47
Subtotal	-2728.87		7472.59
Total	-0.22		14009

Since the summation of forces is approximately zero, the assumed location of the plastic neutral axis is correct.

$$\phi M_{nx} = 0.9 \times 14{,}009 = 12{,}608 \text{ kip-ft}$$

Calculate the uniaxial moment capacity from Eqs. H1-1a and H1-1b for assumed values of the load ratio $R_u = P_u / \phi_c P_n$.

$$M_{ux} = 12{,}608 \times (1 - R_u) \times 9/8 \quad \text{if } R_u \geq 0.2$$

$$M_{ux} = 12{,}608 \times (1 - R_u / 2.0) \quad \text{if } R_u < 0.2$$

Points on the interaction curve are calculated as follows:

R_u	0.0	0.2	0.3	0.4	0.5	0.7	0.9
M_{ux}	12,610	11,350	9,930	8,510	7,090	4,260	1,420

These values agree with the circled values in Table A.

3. Nominal flexural strength about y-axis.

Try

$$X_b = 25.55 \text{ in.}$$

$$X_t = 48 - X_b = 48 - 25.55 = 22.45 \text{ in.}$$

$a = \beta_1 X_t = 0.8 \times 22.45 = 17.96$ in.

$X_a = 48 - a = 48 - 17.96 = 30.04$ in.

	Force (kips)	x-X_b (in.)	Moment (ft-kips)
Concrete			
4.25 × 48 × 17.9565	3663.13	13.4674	4111.07
Rebars			
1. -60 × 2.25	-135.0	-22.7084	255.47
2. -60 × 2.25	-135.0	-18.4754	207.85
3. -60 × 2.25	-135.0	-14.2424	160.23
4. -60 × 2.25	-135.0	-22.7084	255.47
5. -60 × 2.25	-135.0	-22.7084	255.47
6. 55.75 × 2.25	125.4375	19.5996	204.88
7. 55.75 × 2.25	125.4375	15.3666	160.63
8. 55.75 × 2.25	125.4375	11.1336	116.38
9. 55.75 × 2.25	125.4375	19.5996	204.88
10. 55.75 × 2.25	125.4375	19.5996	204.88
11. -60 × 2.25	-135.0	-22.7084	255.47
12. -60 × 2.25	-135.0	-18.4754	207.85
13. -60 × 2.25	-135.0	-14.2424	160.23
14. -60 × 2.25	-135.0	-22.7084	255.47
15. -60 × 2.25	-135.0	-22.7084	255.47
16. 55.75 × 2.25	125.4375	19.5996	204.88
17. 55.75 × 2.25	125.4375	15.3666	160.63
18. 55.75 × 2.25	125.4375	11.1336	116.38
19. 55.75 × 2.25	125.4375	19.5996	204.88
20. 55.75 × 2.25	125.4375	19.5996	204.88
Subtotal (Rebars)	-95.625		4052.28
Steel			
(50 - 0.85 × 5)(32.945 - 30.0435) × 4.91 × 2	1303.54	5.9399	645.24
50 × (30.0435 - 25.5544) × 4.91 × 2	2204.15	2.2446	412.29
-50 × (25.5544 - 25.535) × 4.91 × 2	-9.53	-0.0097	0.01
-50 × 3.07 × 22.42	-3441.47	-1.5544	445.79
-50 × 7.41 × 4.91 × 2	-3638.31	-6.7944	2060.01
Subtotal (Steel)	-3581.62		3563.34
Total	-14.12		11730

$\phi M_{nx} = 0.9 \times 11{,}730 = 10{,}550$ kip-ft

$M_{ux} = 10{,}550 \times (1.0 - R_u / 2.0)$ if $R_u = P_u / \phi_c P_n \leq 0.2$

$M_{ux} = 10{,}550 \times (1.0 - R_u) \times 9/8$ if $R_u = P_u / \phi_c P_n > 0.2$

R_u	0.0	0.2	0.3	0.4	0.5	0.7	0.9
M_{ux}	10,550	9,500	8,310	7,120	5,940	3,560	1,190

These values agree with the circled values in Table A.

Example 3:

Design a 20×20-in. composite column with an encased W-shape to resist a factored axial load of 470 kips and a factored moment about the x-axis of 350 kip-ft. The loads are obtained from a second order analysis. Use f_c'= 5 ksi, F_{yr}= 60 ksi, F_y = 50 ksi, and KL= 17 ft.

Solution:

1. Calculate relative eccentricity:

$$M_u / (P_u t) = 350 / (470 \times 1.67) = 0.45$$

2. Determine trial load ratio:

$$M_u / (P_u t) > 0.33, \quad \text{use } R_u = 0.3$$

3. Calculate required axial strength:

$$\phi_c P_n = P_u / R_u = 470 / 0.3 = 1{,}567 \text{ kips}$$

4. Select trial column:

Try 20×20-in. composite column, W8×58 column, 4-#7 (2x - 2y)

$$\phi_c P_n = 1{,}570 \text{ kips for } KL = 17 \text{ ft}$$

5. Calculate load ratio for trial column:

$$R_u = P_u / \phi_c P_n = 470 / 1{,}570 = 0.33$$

6. Determine uniaxial moment capacity:

From Table B with $R_u = P_u / \phi_c P_n = 0.3$, $M_{ux} = 354$ kip-ft

7. Compare to factored moment:

M_{ux} = 354 kip-ft (from Table B) > 350 kip-ft required **o.k.**

Use 20×20-in. composite column with W8×58 (F_y = 50 ksi), f_c' = 5 ksi, 4-#7 bars (2x - 2y) vertical bars and #3 ties at 13 in.

Table B

COMPOSITE BEAM—COLUMN DESIGN CAPACITY — LRFD
(See Examples 3 and 4)

$\phi_c = 0.85$ f_c': 5.0 ksi NW
$\phi_b = 0.90$ F_{yr}: 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size (b x h): 48 x 48

Designation		W8x67								W8x58							
F_y (ksi)		36				50				36				50			
Reinf.	KL	$\phi_c P_n$	$P_u/(\phi_c P_n)$	M_{ux}	M_{uy}	$\phi_c P_n$	$P_u/(\phi_c P_n)$	M_{ux}	M_{uy}	$\phi_c P_n$	$P_u/(\phi_c P_n)$	M_{ux}	M_{uy}	$\phi_c P_n$	$P_u/(\phi_c P_n)$	M_{ux}	M_{uy}
.60%	0	1650	0.0	408	397	1890	0.0	492	455	1580	0.0	377	374	1780	0.0	450	429
A_r (in.^{2})	11	1580	0.2	367	357	1790	0.2	443	410	1510	0.2	340	336	1690	0.2	405	386
= 2.40	13	1550	0.3	321	313	1750	0.3	388	358	1480	0.3	297	294	1650	0.3	354	338
	17	1480	0.4	275	268	1660	0.4	332	307	1410	0.4	255	252	1570	0.4	304	289
4-#7	21	1400	0.5	229	223	1560	0.5	277	256	1330	0.5	212	210	1460	0.5	253	241
2*x* – 2*y*	25	1300	0.7	137	134	1440	0.7	166	153	1230	0.7	127	126	1350	0.7	152	144
	40	898	0.9	45	44	941	0.9	55	51	836	0.9	42	42	869	0.9	50	48
#3 Ties		C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}
@13 in		213	213	6.00	6.00	213	213	6.00	6.00	195	195	6.00	6.00	195	195	6.00	6.00
1.00%	0	1710	0.0	460	449	1940	0.0	544	507	1630	0.0	430	426	1840	0.0	502	481
A_r (in.^{2})	11	1630	0.2	414	404	1840	0.2	490	456	1550	0.2	387	383	1740	0.2	452	432
= 4.00	13	1600	0.3	362	354	1800	0.3	429	399	1520	0.3	338	335	1700	0.3	395	378
	17	1520	0.4	311	303	1700	0.4	367	342	1450	0.4	290	287	1610	0.4	339	324
4-#9	21	1430	0.5	259	252	1590	0.5	306	285	1360	0.5	241	239	1500	0.5	282	270
2*x* – 2*y*	25	1330	0.7	155	151	1470	0.7	183	171	1260	0.7	145	143	1370	0.7	169	162
	40	908	0.9	51	50	948	0.9	61	57	845	0.9	48	47	875	0.9	56	54
#3 Ties		C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}
@13 in		213	213	6.00	6.00	213	213	6.00	6.00	195	195	6.00	6.00	195	195	6.00	6.00
2.00%	0	1840	0.0	594	514	2070	0.0	678	571	1760	0.0	563	491	1970	0.0	636	546
A_r (in.^{2})	11	1750	0.2	535	463	1960	0.2	610	514	1670	0.2	507	442	1850	0.2	572	491
= 8.00	13	1710	0.3	468	405	1910	0.3	534	450	1640	0.3	444	386	1810	0.3	501	430
	17	1630	0.4	401	347	1800	0.4	458	385	1550	0.4	380	331	1700	0.4	429	368
8-#9	21	1520	0.5	334	289	1680	0.5	381	321	1450	0.5	317	276	1580	0.5	358	307
4*x* – 2*y*	25	1410	0.7	200	173	1540	0.7	229	192	1340	0.7	190	165	1440	0.7	214	184
	40	930	0.9	66	57	961	0.9	76	64	863	0.9	63	55	887	0.9	71	61
#3 Ties		C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}
@13 in		212	212	6.00	6.00	212	212	6.00	6.00	194	194	6.00	6.00	194	194	6.00	6.00
3.00%	0	1970	0.0	679	647	2200	0.0	764	704	1900	0.0	649	624	2100	0.0	721	679
A_r (in.^{2})	11	1860	0.2	611	583	2070	0.2	687	633	1790	0.2	584	562	1970	0.2	649	611
= 12.00	13	1820	0.3	535	510	2020	0.3	601	554	1750	0.3	511	492	1920	0.3	568	534
	17	1730	0.4	458	437	1900	0.4	515	475	1650	0.4	438	421	1800	0.4	487	458
12-#9	21	1610	0.5	382	364	1760	0.5	429	396	1530	0.5	365	351	1660	0.5	406	381
4*x* – 4*y*	25	1480	0.7	229	218	1600	0.7	257	237	1400	0.7	219	210	1500	0.7	243	229
	40	947	0.9	76	72	971	0.9	85	79	877	0.9	73	70	894	0.9	81	76
#3 Ties		C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}
@13 in		211	211	6.00	6.00	211	211	6.00	6.00	193	193	6.00	6.00	193	193	6.00	6.00
3.81%	0	2080	0.0	762	721	2310	0.0	846	778	2000	0.0	731	698	2210	0.0	804	752
A_r (in.^{2})	11	1960	0.2	686	649	2170	0.2	761	700	1880	0.2	658	628	2060	0.2	723	676
= 15.24	13	1910	0.3	600	568	2110	0.3	666	613	1840	0.3	576	549	2010	0.3	633	592
	17	1810	0.4	514	486	1980	0.4	571	525	1730	0.4	494	471	1880	0.4	542	507
12-#10	21	1680	0.5	428	405	1820	0.5	476	437	1600	0.5	411	392	1720	0.5	452	423
4*x* – 4*y*	25	1540	0.7	257	243	1650	0.7	285	262	1460	0.7	247	235	1550	0.7	271	253
	40	957	0.9	85	81	976	0.9	95	87	885	0.9	82	78	897	0.9	90	84
#3 Ties		C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}	C_{ex}	C_{ey}	r_{mx}	r_{my}
@13 in		211	211	6.00	6.00	211	211	6.00	6.00	193	193	6.00	6.00	193	193	6.00	6.00

Notes: 1. $C_{ex} = P_{ex}(K_xL_x)^2/10{,}000$ (kip-ft^2), $C_{ey} = P_{ey}(K_yL_y)^2/10{,}000$ (kip-ft^2), in ft, r_{mx} and r_{my} in inches.
2. Zeroes in columns lor $\phi_c P_n$, M_{ux}, and M_{uy} indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement *(nx- my)*. NW = normal weight concrete.
4. $M_{ux} = \phi_b M_{nx}$ and $M_{uy} = \phi_b M_{ny}$ when $P_u/(\phi_c P_n) = 0.0$

Example 4:

Design a 20×20-in. composite column with an encased W-shape to resist a factored axial load of 1,190 kips and a factored moment about the x-axis of 180 kip-ft. The loads are obtained from a second order analysis. Use f_c' = 5 ksi, F_{yr} = 60 ksi, F_y = 50 ksi, and KL = 17 ft.

Solution:

1. Calculate relative eccentricity:

$$M_u / (P_u t) = 180 / (1{,}190 \times 1.67) = 0.09$$

2. Determine trial load ratio:

$$M_u / (P_u t) < 0.10, \quad \text{use } R_u = 0.7$$

3. Calculate required axial strength:

$$\phi_c P_n = P_u / R_u = 1{,}190 / 0.7 = 1{,}700 \text{ kips}$$

4. Select trial column:

Try 20×20-in. composite column, W8×67 column, 4-#9 (2x - 2y)

$$\phi_c P_n = 1{,}700 \text{ kips for } KL = 17 \text{ ft}$$

5. Calculate load ratio for trial column:

$$R_u = P_u / \phi_c P_n = 1{,}190 / 1{,}700 = 0.7$$

6. Determine uniaxial moment capacity:

From Table B with $R_u = P_u / \phi_c P_n = 0.7$, M_{ux} = 183 kip-ft

7. Compare to factored moment:

M_{ux} = 183 kip-ft (from Table B) > 180 kip-ft required **o.k.**

Use 20×20-in. composite column with W8×67 (F_y = 50 ksi), f_c' = 5 ksi, 4-#9 bars (2x - 2y) vertical bars and #3 ties at 13 in.

Example 5:

Design the base plate of a 18×18-in. composite column with an encased W10×54 of F_y = 36 ksi, f_c'= 8 ksi, and 4-#8 grade 60 longitudinal bars. Factored axial load P_u = 1,000 kips, KL = 31 ft. Use f_c'= 3 ksi for footing. Assume $(A_2 / A_1)^{1/2} \geq 2$. See Fig. B-2 for nomenclature. Refer to AISC LRFD Manual, p. 2-101 for base plate design procedure.

Solution:

Base plate will be designed for the portion of the factored axial load resisted by the W10×54.

W10×54 properties:

b_f = 10.03 in.
d = 10.09 in.
t_f = 0.615 in.
A_s = 15.8 in.^{2}

Try base plate 12×12 in.

1. Compute axial load carried by W10×54 based on the contribution of W10×54 to the total column capacity.

$$F_{my} = F_y + F_{yr}\ (A_r / A_s) + c_2 f_c'\ (A_c / A_s)$$
$$= 36 + (0.7 \times 60 \times 3.16 / 15.8) + (0.6 \times 8(18 \times 18 - 15.8 - 4 \times 0.79) / 15.8)$$
$$= 137.07 \text{ ksi}$$

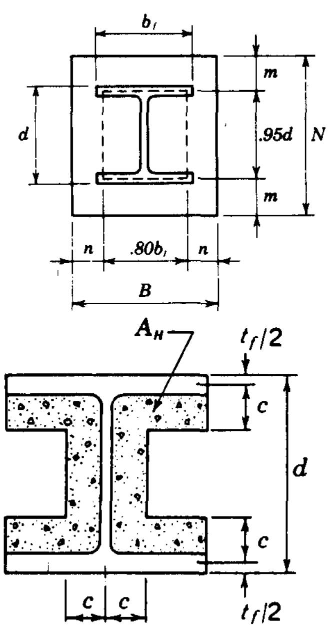
Portion of factored axial load resisted by W10×54 is:

$$P_s = 1{,}000 \times 36 / 137.07 = 262.64 \text{ kips}$$

2. Compute m and n.

$$m = (N - 0.95d) / 2 = (12 - 0.95 \times 10.09) / 2 = 1.207$$

$n = (B - 0.8b_f) / 2 = (12 - 0.8 \times 10.03) / 2 = 1.988$ **governs**



P_o = factored load contributory to area enclosed by steel shape, kips
P_s = Factored axial load resisted by steel shape, kips
A_1 = Area of base plate, in.^{2}
A_2 = Full cross sectional area of concrete support, in.^{2}
A_H = Area of H-shaped portion of base plate in light columns, in.^{2}
F_y = Specified minimum yield stress of steel, ksi
f_c' = Specified compressive strength of concrete, ksi
t_p = Thickness of base plate, in.
ϕ_c = Resistance factor for concrete = 0.6
ϕ_p = Resistance factor for base plate = 0.9

Fig. B-2. Column base plates.

3. Concrete bearing stress.

$$\phi 0.85 f_c' (A_2 / A_1)^{0.5} = 0.6 \times 0.85 \times 3 \times 2 = 3.06 \text{ ksi}$$

4. Check concrete bearing under base plate.

$$P_s / (BN) = 262.64 / (12 \times 12) = 1.824 \text{ ksi} < 3.06 \quad \textbf{o.k.}$$

5. Compute factored load contributary to the area enclosed by W10×54.

$$P_o = P_s b_f d / (BN) = 262.64 \times 10.03 \times 10.09 / (12 \times 12) = 184.58 \text{ kips}$$

6. Compute area of H-shaped region.

$$A_H = P_o / (0.6 \times 1.7 \times f_c') = 184.58 / (0.6 \times 1.7 \times 3) = 60.32 \text{ in.}^2$$

7. Compute c.

$$c = (d + b_f - t_f - ((d + b_f - t_f)^2 - 4(A_H - t_f b_f))^{½}) / 4$$

$$= (10.09 + 10.03 - 0.615 - ((10.09 + 10.03 - 0.615)^2 - 4 \times (60.32 - 0.615 \times 10.03))^{½}) / 4$$

$$= 1.676$$

8. Compute base plate thickness.

$$t_p = \max(m, n) \times (2P_s \;/\; (0.9 F_y BN))^{½}$$

$$= 1.988 \times (2 \times 262.64 / (0.9 \times 36 \times 12 \times 12))^{½} = 0.667 \text{ in.}$$

$$t_p = c(2P_o \;/\; 0.9 F_y A_H))^{½}$$

$$= 1.676 \times (2 \times 184.58 / (0.9 \times 36 \times 60.32))^{½} = 0.728 \text{ in.}$$

Use ¾-in. plate.

9. Design dowels to foundation.

Allowable compression transfer by concrete:

$$= 2\phi_c 0.85 f_c' \,(\textit{column area} - \textit{base plate area})$$

$$= 2 \times 0.6 \times 0.85 \times 3\ (18 \times 18 - 12 \times 12)$$

$$= 550.8 \text{ kips}$$

Required compression transfer by concrete:

$$= 1{,}000 - 262.64$$

$$= 737.36 \text{ kips} > 550.8 \text{ kips} \quad \textbf{Dowels are required.}$$

Required area of dowels:

$$A_d \text{ (req'd)} = (737.36 - 550.8) / 60 = 3.11 \text{ in.}^2$$

$$A_d \text{ (min.)} = 0.005 A_g = 0.005 \times 18 \times 18 = 1.62 \text{ in.}^2 \quad \text{(ACI 318-89 Section 15.8.2.1)}$$

Use 4-#8, A_s *(provided)* = 4 × 0.79 = 3.16 in.^{2} > 3.11 **o.k.**

Embed dowels 22 bar diameters (for 3,000 psi concrete) into foundation (ACI 318-89 Section 12.3.1) = 22 × 1.00 = 22 in.

Dowel projection into column = 30 bar diameters (ACI 318-89 Section 12.16.1) = 30 × 1.00 = 30 in.

PART 4: LRFD COMPOSITE BEAM-COLUMN DESIGN TABLES

Instructions for Using LRFD Composite Beam-Column Design Tables

1. Determine the relative magnitude of the column eccentricity by dividing the applied factored moment, M_u (ft-kips), by the product of the applied factored axial load, P_u (kips), and the composite column dimension in the plane of bending, t.

2. Select a first trial value of the load ratio, R_u, depending on the relative magnitude of eccentricity calculated from step one, as follows:

   $R_u = 0.3$, if $M_u / (P_u t) \geq 0.33$ (large eccentricity)

   $R_u = 0.5$, if $0.10 M_u / (P_u t) < 0.33$ (moderate eccentricity)

   $R_u = 0.7$, if $M_u / (P_u t) \leq 0.10$ (large eccentricity)

3. Compute required axial design strength $\phi_c P_n = P_u / R_u$.

4. For a given desired column size $(b \times h)$ and concrete strength (f_c'), and a known effective unbraced length (KL), select a trial column having $\phi_c P_n$ approximately equal to P_u.

5. Compute the load ratio, $R_u = P_u / (\phi_c P_n)$ for the trial column selected.

6. From the Table, for $R_u = P_u / (\phi_c P_n)$ as calculated from Step 5, find the uniaxial moment capacity M_{ux} (or M_{uy} as applicable).

7. Compare to the factored moment.

   If M_{ux} (or M_{uy}) $\geq M_u$ (and reasonably close to), trial column is satisfactory.

   If M_{ux} (or M_{uy}) $< M_u$, trial column is not satisfactory.

8. If column is not satisfactory, repeat steps four through seven with a new trial column. Adjustments to get the required capacity can be made by changing any of the following variables:

   a. column size
   b. concrete strength
   c. WF column size
   d. percentage of vertical steel

   If M_{ux} (or M_{uy}) $\geq M_u$, reenter the Tables with a larger $R_u = P_u / (\phi_c P_n)$ ratio.

   If M_{ux} (or M_{uy}) $< M_u$, reenter the Tables with a smaller $R_u = P_u / (\phi_c P_n)$ ratio.

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85   f'c : 8.0 ksi NW
φb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 36 x 36

Designation		W 14 x426								W 14 x398							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.48 %	0	8800	0.0	4000	3680	10300	0.0	5020	4300	8590	0.0	3800	3550	9980	0.0	4750	4160
Ar(in²)	11	8680	0.2	3600	3310	10100	0.2	4520	3870	8470	0.2	3420	3200	9820	0.2	4270	3740
= 6.24	13	8630	0.3	3150	2900	10100	0.3	3950	3390	8420	0.3	2990	2800	9750	0.3	3740	3270
	17	8520	0.4	2700	2480	9900	0.4	3390	2900	8300	0.4	2560	2400	9600	0.4	3210	2810
4-#11	21	8370	0.5	2250	2070	9700	0.5	2820	2420	8160	0.5	2140	2000	9400	0.5	2670	2340
2x-2y	25	8200	0.7	1350	1240	9470	0.7	1690	1450	7990	0.7	1280	1200	9170	0.7	1600	1400
	40	7340	0.9	449	414	8320	0.9	564	484	7130	0.9	427	399	8040	0.9	534	467
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3820	3820	10.80	10.80	3820	3820	10.80	10.80	3640	3640	10.80	10.80	3640	3640	10.80	10.80
.96 %	0	9000	0.0	4410	4000	10500	0.0	5440	4620	8790	0.0	4220	3870	10200	0.0	5160	4470
Ar(in²)	11	8870	0.2	3970	3600	10300	0.2	4890	4160	8660	0.2	3790	3490	10000	0.2	4650	4030
=12.48	13	8820	0.3	3480	3150	10200	0.3	4280	3640	8610	0.3	3320	3050	9940	0.3	4070	3520
	17	8700	0.4	2980	2700	10100	0.4	3670	3120	8490	0.4	2850	2610	9780	0.4	3490	3020
8-#11	21	8550	0.5	2480	2250	9880	0.5	3060	2600	8340	0.5	2370	2180	9580	0.5	2910	2520
4x-2y	25	8370	0.7	1490	1350	9630	0.7	1830	1560	8160	0.7	1420	1310	9340	0.7	1740	1510
	40	7470	0.9	496	449	8440	0.9	611	519	7260	0.9	474	435	8160	0.9	581	503
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3810	3810	10.80	10.80	3810	3810	10.80	10.80	3630	3630	10.80	10.80	3630	3630	10.80	10.80
1.96 %	0	9410	0.0	5070	4680	10900	0.0	6090	5300	9190	0.0	4870	4560	10600	0.0	5820	5150
Ar(in²)	11	9270	0.2	4560	4210	10700	0.2	5480	4770	9060	0.2	4380	4100	10400	0.2	5240	4640
=25.40	13	9210	0.3	3990	3690	10600	0.3	4790	4170	9000	0.3	3830	3590	10300	0.3	4580	4060
	17	9080	0.4	3420	3160	10500	0.4	4110	3580	8870	0.4	3290	3080	10200	0.4	3930	3480
20-#10	21	8910	0.5	2850	2630	10200	0.5	3420	2980	8700	0.5	2740	2560	9940	0.5	3270	2900
6x-6y	25	8720	0.7	1710	1580	9970	0.7	2050	1790	8500	0.7	1640	1540	9680	0.7	1960	1740
	40	7740	0.9	569	526	8690	0.9	684	596	7530	0.9	547	512	8410	0.9	654	579
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		3800	3800	10.80	10.80	3800	3800	10.80	10.80	3620	3620	10.80	10.80	3620	3620	10.80	10.80
2.89 %	0	9790	0.0	5800	5190	11300	0.0	6820	5800	9570	0.0	5610	5070	11000	0.0	6550	5650
Ar(in²)	11	9640	0.2	5220	4670	11100	0.2	6140	5220	9420	0.2	5050	4560	10800	0.2	5900	5090
=37.44	13	9580	0.3	4570	4090	11000	0.3	5370	4560	9370	0.3	4410	3990	10700	0.3	5160	4450
	17	9430	0.4	3920	3500	10800	0.4	4610	3910	9220	0.4	3780	3420	10500	0.4	4420	3810
24-#11	21	9250	0.5	3260	2920	10600	0.5	3840	3260	9040	0.5	3150	2850	10300	0.5	3690	3180
8x-6y	25	9040	0.7	1960	1750	10300	0.7	2300	1960	8820	0.7	1890	1710	9990	0.7	2210	1910
	40	7990	0.9	652	583	8920	0.9	767	652	7770	0.9	630	569	8630	0.9	737	635
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3790	3790	10.80	10.80	3790	3790	10.80	10.80	3610	3610	10.80	10.80	3610	3610	10.80	10.80
3.70 %	0	10100	0.0	6330	5970	11600	0.0	7350	6580	9910	0.0	6130	5850	11300	0.0	7070	6430
Ar(in²)	11	9960	0.2	5690	5370	11400	0.2	6610	5920	9750	0.2	5520	5260	11100	0.2	6370	5790
=48.00	13	9900	0.3	4980	4700	11300	0.3	5790	5180	9680	0.3	4830	4610	11000	0.3	5570	5070
	17	9740	0.4	4270	4030	11100	0.4	4960	4440	9530	0.4	4140	3950	10800	0.4	4770	4340
12-#18	21	9550	0.5	3560	3360	10900	0.5	4130	3700	9330	0.5	3450	3290	10600	0.5	3980	3620
4x-4y	25	9320	0.7	2130	2010	10600	0.7	2480	2220	9100	0.7	2070	1970	10300	0.7	2390	2170
	40	8200	0.9	711	671	9120	0.9	826	739	7980	0.9	689	657	8830	0.9	795	723
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3780	3780	10.80	10.80	3780	3780	10.80	10.80	3610	3610	10.80	10.80	3610	3610	10.80	10.80

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 36 x 36

Designation		W 14 x370								W 14 x342							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.48 %	0	8380	0.0	3610	3430	9670	0.0	4480	4010	8160	0.0	3420	3300	9370	0.0	4220	3860
Ar(in²)	11	8260	0.2	3250	3090	9510	0.2	4030	3610	8040	0.2	3070	2970	9210	0.2	3800	3470
= 6.24	13	8210	0.3	2840	2700	9450	0.3	3530	3160	8000	0.3	2690	2600	9150	0.3	3320	3040
	17	8090	0.4	2430	2310	9300	0.4	3030	2710	7880	0.4	2310	2220	8990	0.4	2850	2600
4-#11	21	7950	0.5	2030	1930	9100	0.5	2520	2250	7730	0.5	1920	1850	8800	0.5	2370	2170
2x-2y	25	7770	0.7	1220	1160	8880	0.7	1510	1350	7560	0.7	1150	1110	8580	0.7	1420	1300
	40	6920	0.9	405	385	7760	0.9	504	450	6710	0.9	384	370	7480	0.9	474	433
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3460	3460	10.80	10.80	3460	3460	10.80	10.80	3280	3280	10.80	10.80	3280	3280	10.80	10.80
.96 %	0	8570	0.0	4020	3750	9870	0.0	4900	4330	8360	0.0	3830	3620	9560	0.0	4640	4170
Ar(in²)	11	8450	0.2	3620	3370	9700	0.2	4410	3890	8230	0.2	3450	3250	9400	0.2	4170	3760
=12.48	13	8400	0.3	3170	2950	9640	0.3	3860	3410	8190	0.3	3020	2850	9330	0.3	3650	3290
	17	8280	0.4	2720	2530	9480	0.4	3310	2920	8060	0.4	2590	2440	9170	0.4	3130	2820
8-#11	21	8120	0.5	2260	2110	9280	0.5	2760	2430	7910	0.5	2160	2030	8980	0.5	2610	2350
4x-2y	25	7940	0.7	1360	1270	9040	0.7	1650	1460	7730	0.7	1290	1220	8740	0.7	1560	1410
	40	7050	0.9	452	421	7880	0.9	551	486	6840	0.9	431	406	7600	0.9	521	469
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3450	3450	10.80	10.80	3450	3450	10.80	10.80	3280	3280	10.80	10.80	3280	3280	10.80	10.80
1.96 %	0	8980	0.0	4680	4430	10300	0.0	5550	5010	8770	0.0	4480	4300	9970	0.0	5290	4860
Ar(in²)	11	8840	0.2	4210	3990	10100	0.2	5000	4510	8630	0.2	4040	3870	9790	0.2	4760	4370
=25.40	13	8790	0.3	3680	3490	10000	0.3	4370	3940	8580	0.3	3530	3390	9720	0.3	4170	3820
	17	8650	0.4	3160	2990	9850	0.4	3750	3380	8440	0.4	3030	2900	9550	0.4	3570	3280
20-#10	21	8490	0.5	2630	2490	9630	0.5	3120	2820	8270	0.5	2520	2420	9330	0.5	2980	2730
6x-6y	25	8290	0.7	1580	1500	9380	0.7	1870	1690	8070	0.7	1510	1450	9080	0.7	1790	1640
	40	7310	0.9	526	498	8120	0.9	624	563	7100	0.9	504	483	7840	0.9	595	546
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		3440	3440	10.80	10.80	3440	3440	10.80	10.80	3270	3270	10.80	10.80	3270	3270	10.80	10.80
2.89 %	0	9360	0.0	5410	4940	10700	0.0	6290	5500	9150	0.0	5220	4810	10400	0.0	6030	5350
Ar(in²)	11	9210	0.2	4870	4440	10500	0.2	5660	4950	9000	0.2	4700	4330	10200	0.2	5420	4820
=37.44	13	9150	0.3	4260	3890	10400	0.3	4950	4330	8940	0.3	4110	3790	10100	0.3	4750	4220
	17	9010	0.4	3650	3330	10200	0.4	4240	3720	8790	0.4	3520	3250	9890	0.4	4070	3610
24-#11	21	8820	0.5	3050	2780	9960	0.5	3540	3100	8610	0.5	2940	2700	9660	0.5	3390	3010
8x-6y	25	8610	0.7	1830	1670	9690	0.7	2120	1860	8390	0.7	1760	1620	9390	0.7	2030	1810
	40	7550	0.9	609	555	8350	0.9	707	619	7330	0.9	587	540	8060	0.9	677	602
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3430	3430	10.80	10.80	3430	3430	10.80	10.80	3260	3260	10.80	10.80	3260	3260	10.80	10.80
3.70 %	0	9700	0.0	5940	5730	11000	0.0	6810	6290	9480	0.0	5740	5600	10700	0.0	6550	6140
Ar(in²)	11	9530	0.2	5340	5150	10800	0.2	6130	5660	9320	0.2	5170	5040	10500	0.2	5890	5520
=48.00	13	9470	0.3	4670	4510	10700	0.3	5360	4950	9260	0.3	4520	4410	10400	0.3	5160	4830
	17	9310	0.4	4010	3860	10500	0.4	4600	4240	9100	0.4	3880	3780	10200	0.4	4420	4140
12-#18	21	9120	0.5	3340	3220	10300	0.5	3830	3540	8900	0.5	3230	3150	9950	0.5	3680	3450
4x-4y	25	8890	0.7	2000	1930	9960	0.7	2300	2120	8670	0.7	1940	1890	9660	0.7	2210	2070
	40	7760	0.9	667	644	8540	0.9	766	707	7530	0.9	646	629	8250	0.9	736	690
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3430	3430	10.80	10.80	3430	3430	10.80	10.80	3250	3250	10.80	10.80	3250	3250	10.80	10.80

Notes : 1. Cex = $P_{ex}(K_xL_x)^2/10000.$ (kip-ft²), Cey = $P_{ey}(K_yL_y)^2/10000.$ (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 36 x 36

Designation		W 14 x311								W 14 x283							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.48 %	0	7910	0.0	3210	3140	9000	0.0	3940	3680	7690	0.0	3030	3000	8690	0.0	3690	3510
Ar(in²)	11	7790	0.2	2890	2830	8840	0.2	3540	3310	7570	0.2	2720	2700	8530	0.2	3320	3160
= 6.24	13	7740	0.3	2530	2480	8780	0.3	3100	2900	7530	0.3	2380	2360	8470	0.3	2900	2770
	17	7620	0.4	2170	2120	8630	0.4	2660	2480	7410	0.4	2040	2030	8320	0.4	2490	2370
4-#11	21	7480	0.5	1800	1770	8440	0.5	2210	2070	7260	0.5	1700	1690	8140	0.5	2070	1980
2x-2y	25	7310	0.7	1080	1060	8220	0.7	1330	1240	7090	0.7	1020	1010	7920	0.7	1240	1190
	40	6450	0.9	360	353	7140	0.9	442	413	6240	0.9	340	337	6850	0.9	414	395
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3070	3070	10.80	10.80	3070	3070	10.80	10.80	2880	2880	10.80	10.80	2880	2880	10.80	10.80
.96 %	0	8110	0.0	3630	3470	9190	0.0	4350	4000	7890	0.0	3440	3320	8880	0.0	4100	3830
Ar(in²)	11	7980	0.2	3260	3120	9030	0.2	3920	3600	7760	0.2	3100	2990	8720	0.2	3690	3450
=12.48	13	7930	0.3	2850	2730	8970	0.3	3430	3150	7710	0.3	2710	2620	8660	0.3	3230	3020
	17	7810	0.4	2450	2340	8810	0.4	2940	2700	7590	0.4	2320	2240	8500	0.4	2770	2590
8-#11	21	7650	0.5	2040	1950	8610	0.5	2450	2250	7440	0.5	1940	1870	8310	0.5	2310	2160
4x-2y	25	7470	0.7	1220	1170	8380	0.7	1470	1350	7250	0.7	1160	1120	8080	0.7	1380	1290
	40	6580	0.9	407	389	7260	0.9	489	449	6360	0.9	387	374	6970	0.9	461	431
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3060	3060	10.80	10.80	3060	3060	10.80	10.80	2880	2880	10.80	10.80	2880	2880	10.80	10.80
1.96 %	0	8510	0.0	4280	4150	9600	0.0	5010	4680	8300	0.0	4100	4010	9290	0.0	4750	4520
Ar(in²)	11	8370	0.2	3850	3740	9420	0.2	4510	4210	8160	0.2	3690	3610	9110	0.2	4280	4070
=25.40	13	8320	0.3	3370	3270	9350	0.3	3940	3680	8100	0.3	3220	3160	9040	0.3	3740	3560
	17	8180	0.4	2890	2800	9180	0.4	3380	3160	7970	0.4	2760	2710	8870	0.4	3210	3050
20-#10	21	8010	0.5	2410	2340	8970	0.5	2820	2630	7790	0.5	2300	2260	8660	0.5	2670	2540
6x-6y	25	7810	0.7	1440	1400	8720	0.7	1690	1580	7590	0.7	1380	1350	8410	0.7	1600	1520
	40	6830	0.9	481	467	7490	0.9	563	526	6610	0.9	460	451	7200	0.9	534	508
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		3050	3050	10.80	10.80	3050	3050	10.80	10.80	2870	2870	10.80	10.80	2870	2870	10.80	10.80
2.89 %	0	8900	0.0	5020	4660	9980	0.0	5740	5190	8680	0.0	4830	4520	9670	0.0	5490	5020
Ar(in²)	11	8740	0.2	4510	4190	9790	0.2	5170	4670	8530	0.2	4350	4070	9480	0.2	4940	4520
=37.44	13	8680	0.3	3950	3670	9710	0.3	4520	4080	8460	0.3	3810	3560	9400	0.3	4320	3950
	17	8530	0.4	3390	3150	9530	0.4	3880	3500	8310	0.4	3260	3050	9220	0.4	3710	3390
24-#11	21	8350	0.5	2820	2620	9300	0.5	3230	2920	8130	0.5	2720	2540	8990	0.5	3090	2820
8x-6y	25	8130	0.7	1690	1570	9020	0.7	1940	1750	7910	0.7	1630	1530	8720	0.7	1850	1690
	40	7060	0.9	564	524	7710	0.9	645	583	6830	0.9	543	508	7410	0.9	617	564
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3040	3040	10.80	10.80	3040	3040	10.80	10.80	2860	2860	10.80	10.80	2860	2860	10.80	10.80
3.70 %	0	9230	0.0	5540	5450	10300	0.0	6260	5970	9010	0.0	5360	5320	10000	0.0	6010	5810
Ar(in²)	11	9060	0.2	4980	4900	10100	0.2	5640	5370	8850	0.2	4820	4790	9800	0.2	5410	5230
=48.00	13	9000	0.3	4360	4290	10000	0.3	4930	4700	8780	0.3	4220	4190	9720	0.3	4740	4570
	17	8840	0.4	3740	3680	9830	0.4	4230	4030	8620	0.4	3610	3590	9520	0.4	4060	3920
12-#18	21	8640	0.5	3120	3070	9580	0.5	3520	3360	8420	0.5	3010	2990	9270	0.5	3380	3270
4x-4y	25	8400	0.7	1870	1840	9290	0.7	2110	2010	8180	0.7	1810	1800	8980	0.7	2030	1960
	40	7260	0.9	623	613	7890	0.9	704	671	7030	0.9	602	598	7590	0.9	676	653
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3030	3030	10.80	10.80	3030	3030	10.80	10.80	2850	2850	10.80	10.80	2850	2850	10.80	10.80

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 36 x 36

Designation		W 14 x257								W 14 x233							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.48 %	0	7490	0.0	2860	2860	8390	0.0	3450	3350	7300	0.0	2700	2720	8120	0.0	3240	3190
Ar(in²)	11	7370	0.2	2570	2570	8240	0.2	3110	3020	7180	0.2	2430	2450	7960	0.2	2920	2870
= 6.24	13	7320	0.3	2250	2250	8180	0.3	2720	2640	7130	0.3	2130	2140	7900	0.3	2550	2520
	17	7200	0.4	1930	1930	8030	0.4	2330	2260	7010	0.4	1820	1840	7760	0.4	2190	2160
4-#11	21	7050	0.5	1610	1610	7840	0.5	1940	1880	6860	0.5	1520	1530	7580	0.5	1820	1800
2x-2y	25	6880	0.7	964	965	7630	0.7	1170	1130	6690	0.7	911	919	7360	0.7	1090	1080
	40	6030	0.9	321	321	6570	0.9	388	376	5830	0.9	303	306	6320	0.9	364	359
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2710	2710	10.80	10.80	2710	2710	10.80	10.80	2550	2550	10.80	10.80	2550	2550	10.80	10.80
.96 %	0	7690	0.0	3270	3180	8590	0.0	3870	3670	7500	0.0	3120	3050	8310	0.0	3660	3510
Ar(in²)	11	7560	0.2	2950	2870	8430	0.2	3480	3300	7370	0.2	2810	2740	8150	0.2	3290	3160
=12.48	13	7510	0.3	2580	2510	8360	0.3	3050	2890	7320	0.3	2460	2400	8090	0.3	2880	2770
	17	7380	0.4	2210	2150	8210	0.4	2610	2480	7190	0.4	2110	2060	7940	0.4	2470	2370
8-#11	21	7230	0.5	1840	1790	8020	0.5	2180	2060	7030	0.5	1760	1710	7750	0.5	2060	1980
4x-2y	25	7040	0.7	1110	1070	7790	0.7	1310	1240	6850	0.7	1050	1030	7520	0.7	1240	1190
	40	6150	0.9	368	358	6690	0.9	435	412	5950	0.9	351	342	6430	0.9	411	395
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2710	2710	10.80	10.80	2710	2710	10.80	10.80	2550	2550	10.80	10.80	2550	2550	10.80	10.80
1.96 %	0	8100	0.0	3930	3870	9000	0.0	4520	4360	7910	0.0	3770	3740	8720	0.0	4310	4200
Ar(in²)	11	7950	0.2	3530	3490	8820	0.2	4070	3920	7760	0.2	3400	3360	8550	0.2	3880	3780
=25.40	13	7900	0.3	3090	3050	8750	0.3	3560	3430	7710	0.3	2970	2940	8480	0.3	3400	3310
	17	7760	0.4	2650	2610	8580	0.4	3050	2940	7560	0.4	2550	2520	8310	0.4	2910	2840
20-#10	21	7580	0.5	2210	2180	8370	0.5	2540	2450	7390	0.5	2120	2100	8100	0.5	2430	2360
6x-6y	25	7380	0.7	1330	1310	8120	0.7	1530	1470	7180	0.7	1270	1260	7850	0.7	1460	1420
	40	6390	0.9	441	435	6920	0.9	508	490	6190	0.9	424	420	6650	0.9	485	472
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2700	2700	10.80	10.80	2700	2700	10.80	10.80	2540	2540	10.80	10.80	2540	2540	10.80	10.80
2.89 %	0	8480	0.0	4660	4410	9380	0.0	5260	4860	8290	0.0	4510	4310	9100	0.0	5050	4710
Ar(in²)	11	8320	0.2	4200	3970	9180	0.2	4730	4380	8130	0.2	4060	3880	8910	0.2	4540	4240
=37.44	13	8260	0.3	3670	3470	9110	0.3	4140	3830	8070	0.3	3550	3390	8830	0.3	3980	3710
	17	8100	0.4	3150	2980	8920	0.4	3550	3280	7910	0.4	3040	2910	8650	0.4	3410	3180
24-#11	21	7920	0.5	2620	2480	8690	0.5	2960	2740	7720	0.5	2540	2420	8420	0.5	2840	2650
8x-6y	25	7690	0.7	1570	1490	8420	0.7	1780	1640	7490	0.7	1520	1450	8150	0.7	1700	1590
	40	6610	0.9	524	496	7120	0.9	591	547	6400	0.9	507	484	6850	0.9	567	529
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2690	2690	10.80	10.80	2690	2690	10.80	10.80	2530	2530	10.80	10.80	2530	2530	10.80	10.80
3.70 %	0	8810	0.0	5190	5190	9710	0.0	5780	5650	8620	0.0	5030	5050	9440	0.0	5570	5500
Ar(in²)	11	8640	0.2	4670	4670	9500	0.2	5200	5080	8450	0.2	4530	4550	9230	0.2	5010	4950
=48.00	13	8570	0.3	4080	4080	9420	0.3	4550	4450	8380	0.3	3960	3980	9150	0.3	4390	4330
	17	8410	0.4	3500	3500	9220	0.4	3900	3810	8210	0.4	3400	3410	8950	0.4	3760	3710
12-#18	21	8200	0.5	2920	2920	8970	0.5	3250	3180	8000	0.5	2830	2840	8700	0.5	3130	3090
4x-4y	25	7960	0.7	1750	1750	8680	0.7	1950	1910	7760	0.7	1700	1700	8410	0.7	1880	1860
	40	6800	0.9	583	583	7300	0.9	650	635	6580	0.9	566	568	7030	0.9	626	618
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2680	2680	10.80	10.80	2680	2680	10.80	10.80	2520	2520	10.80	10.80	2520	2520	10.80	10.80

Notes : 1. Cex = $Pex(KxLx)^2/10000.$ (kip-ft²), Cey = $Pey(KyLy)^2/10000.$ (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 36 x 36

Designation		W 14 x211								W 14 x193							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.48 %	0	7130	0.0	2560	2590	7870	0.0	3050	3040	6990	0.0	2450	2480	7670	0.0	2900	2920
Ar(in²)	11	7000	0.2	2310	2330	7720	0.2	2750	2740	6870	0.2	2210	2230	7520	0.2	2610	2620
= 6.24	13	6960	0.3	2020	2040	7660	0.3	2400	2400	6820	0.3	1930	1950	7460	0.3	2290	2300
	17	6830	0.4	1730	1750	7510	0.4	2060	2050	6690	0.4	1660	1670	7310	0.4	1960	1970
4-#11	21	6690	0.5	1440	1460	7330	0.5	1720	1710	6540	0.5	1380	1390	7130	0.5	1630	1640
2x-2y	25	6510	0.7	865	874	7110	0.7	1030	1030	6360	0.7	828	836	6920	0.7	979	983
	40	5650	0.9	288	291	6080	0.9	343	342	5500	0.9	276	278	5890	0.9	326	327
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2410	2410	10.80	10.80	2410	2410	10.80	10.80	2290	2290	10.80	10.80	2290	2290	10.80	10.80
.96 %	0	7330	0.0	2980	2910	8060	0.0	3470	3360	7190	0.0	2870	2800	7860	0.0	3320	3240
Ar(in²)	11	7190	0.2	2680	2620	7900	0.2	3120	3030	7060	0.2	2580	2520	7700	0.2	2990	2910
=12.48	13	7140	0.3	2350	2300	7840	0.3	2730	2650	7000	0.3	2260	2210	7640	0.3	2610	2550
	17	7020	0.4	2010	1970	7690	0.4	2340	2270	6870	0.4	1940	1890	7490	0.4	2240	2190
8-#11	21	6860	0.5	1680	1640	7500	0.5	1950	1890	6710	0.5	1620	1580	7300	0.5	1870	1820
4x-2y	25	6670	0.7	1010	983	7270	0.7	1170	1140	6530	0.7	969	946	7070	0.7	1120	1090
	40	5760	0.9	335	327	6190	0.9	390	378	5610	0.9	323	315	6000	0.9	373	364
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2400	2400	10.80	10.80	2400	2400	10.80	10.80	2290	2290	10.80	10.80	2290	2290	10.80	10.80
1.96 %	0	7740	0.0	3630	3600	8470	0.0	4120	4050	7600	0.0	3520	3490	8270	0.0	3970	3930
Ar(in²)	11	7590	0.2	3270	3240	8300	0.2	3710	3650	7450	0.2	3170	3140	8100	0.2	3580	3530
=25.40	13	7530	0.3	2860	2840	8230	0.3	3250	3190	7390	0.3	2780	2750	8030	0.3	3130	3090
	17	7390	0.4	2450	2430	8060	0.4	2780	2730	7240	0.4	2380	2360	7860	0.4	2680	2650
20-#10	21	7210	0.5	2040	2030	7850	0.5	2320	2280	7070	0.5	1980	1970	7640	0.5	2230	2210
6x-6y	25	7000	0.7	1230	1220	7600	0.7	1390	1370	6860	0.7	1190	1180	7400	0.7	1340	1320
	40	6000	0.9	408	405	6410	0.9	463	455	5840	0.9	396	393	6210	0.9	446	441
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2390	2390	10.80	10.80	2390	2390	10.80	10.80	2280	2280	10.80	10.80	2280	2280	10.80	10.80
2.89 %	0	8120	0.0	4370	4190	8850	0.0	4860	4560	7980	0.0	4260	4090	8650	0.0	4710	4450
Ar(in²)	11	7950	0.2	3930	3770	8660	0.2	4370	4100	7810	0.2	3840	3680	8460	0.2	4240	4000
=37.44	13	7890	0.3	3440	3300	8580	0.3	3830	3590	7750	0.3	3360	3220	8380	0.3	3710	3500
	17	7730	0.4	2950	2830	8400	0.4	3280	3080	7590	0.4	2880	2760	8200	0.4	3180	3000
24-#11	21	7540	0.5	2460	2360	8170	0.5	2730	2560	7390	0.5	2400	2300	7970	0.5	2650	2500
8x-6y	25	7310	0.7	1480	1410	7900	0.7	1640	1540	7160	0.7	1440	1380	7690	0.7	1590	1500
	40	6210	0.9	491	471	6610	0.9	546	512	6050	0.9	479	460	6410	0.9	529	500
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2380	2380	10.80	10.80	2380	2380	10.80	10.80	2270	2270	10.80	10.80	2270	2270	10.80	10.80
3.70 %	0	8450	0.0	4890	4920	9190	0.0	5380	5360	8310	0.0	4790	4810	8990	0.0	5230	5240
Ar(in²)	11	8270	0.2	4400	4430	8980	0.2	4840	4830	8130	0.2	4310	4330	8780	0.2	4710	4710
=48.00	13	8200	0.3	3850	3880	8900	0.3	4240	4220	8060	0.3	3770	3790	8690	0.3	4120	4130
	17	8030	0.4	3300	3320	8700	0.4	3630	3620	7890	0.4	3230	3250	8490	0.4	3530	3540
12-#18	21	7820	0.5	2750	2770	8450	0.5	3030	3020	7670	0.5	2690	2710	8240	0.5	2940	2950
4x-4y	25	7570	0.7	1650	1660	8160	0.7	1820	1810	7420	0.7	1610	1620	7950	0.7	1770	1770
	40	6380	0.9	550	553	6770	0.9	605	603	6220	0.9	538	541	6570	0.9	588	589
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2370	2370	10.80	10.80	2370	2370	10.80	10.80	2260	2260	10.80	10.80	2260	2260	10.80	10.80

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 36 x 36

Designation		W 12 x336								W 12 x305							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.48 %	0	8110	0.0	3340	3190	9280	0.0	4080	3660	7860	0.0	3140	3050	8930	0.0	3810	3510
Ar(in²)	11	7980	0.2	3000	2870	9120	0.2	3670	3290	7740	0.2	2830	2750	8770	0.2	3420	3150
= 6.24	13	7940	0.3	2630	2510	9060	0.3	3210	2880	7690	0.3	2470	2410	8710	0.3	3000	2760
	17	7820	0.4	2250	2150	8910	0.4	2750	2470	7580	0.4	2120	2060	8560	0.4	2570	2370
4-#11	21	7680	0.5	1880	1790	8720	0.5	2290	2060	7430	0.5	1770	1720	8370	0.5	2140	1970
2x-2y	25	7500	0.7	1130	1080	8500	0.7	1380	1230	7260	0.7	1060	1030	8150	0.7	1280	1180
	40	6650	0.9	375	358	7400	0.9	458	411	6410	0.9	353	343	7080	0.9	428	394
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3230	3230	10.80	10.80	3230	3230	10.80	10.80	3020	3020	10.80	10.80	3020	3020	10.80	10.80
.96 %	0	8300	0.0	3750	3510	9480	0.0	4490	3980	8060	0.0	3550	3370	9120	0.0	4220	3820
Ar(in²)	11	8180	0.2	3380	3160	9310	0.2	4040	3580	7930	0.2	3200	3040	8960	0.2	3800	3440
=12.48	13	8130	0.3	2950	2760	9250	0.3	3540	3130	7880	0.3	2800	2660	8900	0.3	3320	3010
	17	8000	0.4	2530	2370	9090	0.4	3030	2680	7760	0.4	2400	2280	8740	0.4	2850	2580
8-#11	21	7850	0.5	2110	1970	8890	0.5	2530	2240	7600	0.5	2000	1900	8550	0.5	2370	2150
4x-2y	25	7670	0.7	1270	1180	8660	0.7	1520	1340	7420	0.7	1200	1140	8310	0.7	1420	1290
	40	6780	0.9	422	394	7520	0.9	505	447	6530	0.9	399	379	7190	0.9	474	430
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3230	3230	10.80	10.80	3230	3230	10.80	10.80	3020	3020	10.80	10.80	3020	3020	10.80	10.80
1.96 %	0	8710	0.0	4400	4190	9890	0.0	5140	4660	8470	0.0	4210	4060	9530	0.0	4870	4500
Ar(in²)	11	8570	0.2	3960	3770	9710	0.2	4630	4190	8330	0.2	3790	3650	9360	0.2	4380	4050
=25.40	13	8520	0.3	3470	3300	9640	0.3	4050	3670	8270	0.3	3310	3200	9290	0.3	3840	3550
	17	8380	0.4	2970	2830	9460	0.4	3470	3140	8130	0.4	2840	2740	9110	0.4	3290	3040
20-#10	21	8210	0.5	2480	2360	9250	0.5	2890	2620	7970	0.5	2370	2280	8900	0.5	2740	2530
6x-6y	25	8010	0.7	1490	1410	8990	0.7	1740	1570	7760	0.7	1420	1370	8650	0.7	1640	1520
	40	7040	0.9	495	471	7760	0.9	578	523	6780	0.9	473	456	7430	0.9	548	506
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		3220	3220	10.80	10.80	3220	3220	10.80	10.80	3010	3010	10.80	10.80	3010	3010	10.80	10.80
2.89 %	0	9090	0.0	5140	4700	10300	0.0	5870	5150	8850	0.0	4940	4570	9910	0.0	5600	5000
Ar(in²)	11	8940	0.2	4630	4230	10100	0.2	5290	4640	8690	0.2	4450	4110	9720	0.2	5040	4500
=37.44	13	8880	0.3	4050	3700	10000	0.3	4630	4060	8630	0.3	3890	3600	9650	0.3	4410	3940
	17	8730	0.4	3470	3170	9810	0.4	3970	3480	8480	0.4	3340	3080	9460	0.4	3780	3380
24-#11	21	8550	0.5	2890	2640	9580	0.5	3300	2900	8300	0.5	2780	2570	9230	0.5	3150	2810
8x-6y	25	8330	0.7	1730	1590	9300	0.7	1980	1740	8080	0.7	1670	1540	8960	0.7	1890	1690
	40	7270	0.9	578	528	7980	0.9	660	579	7010	0.9	556	513	7640	0.9	630	562
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3210	3210	10.80	10.80	3210	3210	10.80	10.80	3000	3000	10.80	10.80	3000	3000	10.80	10.80
3.70 %	0	9430	0.0	5660	5480	10600	0.0	6400	5940	9180	0.0	5470	5350	10200	0.0	6130	5790
Ar(in²)	11	9260	0.2	5100	4930	10400	0.2	5760	5340	9020	0.2	4920	4820	10000	0.2	5510	5210
=48.00	13	9200	0.3	4460	4320	10300	0.3	5040	4680	8950	0.3	4300	4220	9960	0.3	4820	4560
	17	9040	0.4	3820	3700	10100	0.4	4320	4010	8790	0.4	3690	3610	9760	0.4	4140	3910
12-#18	21	8840	0.5	3180	3080	9860	0.5	3600	3340	8590	0.5	3070	3010	9510	0.5	3450	3260
4x-4y	25	8610	0.7	1910	1850	9570	0.7	2160	2000	8350	0.7	1840	1810	9220	0.7	2070	1950
	40	7470	0.9	636	616	8160	0.9	719	667	7210	0.9	614	602	7820	0.9	689	651
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3200	3200	10.80	10.80	3200	3200	10.80	10.80	2990	2990	10.80	10.80	2990	2990	10.80	10.80

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 $f'c$: 8.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 36 x 36

Designation		W 12 x279								W 12 x252							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.48 %	0	7660	0.0	2970	2940	8630	0.0	3580	3370	7450	0.0	2810	2810	8330	0.0	3360	3230
Ar(in^2)	11	7540	0.2	2680	2640	8480	0.2	3220	3030	7330	0.2	2530	2530	8180	0.2	3020	2910
= 6.24	13	7490	0.3	2340	2310	8420	0.3	2820	2650	7280	0.3	2210	2210	8120	0.3	2640	2540
	17	7370	0.4	2010	1980	8270	0.4	2420	2280	7160	0.4	1900	1900	7970	0.4	2270	2180
4-#11	21	7220	0.5	1670	1650	8080	0.5	2010	1900	7010	0.5	1580	1580	7790	0.5	1890	1820
2x-2y	25	7050	0.7	1000	990	7860	0.7	1210	1140	6840	0.7	948	948	7570	0.7	1130	1090
	40	6200	0.9	334	330	6800	0.9	402	379	5980	0.9	316	316	6520	0.9	377	363
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2850	2850	10.80	10.80	2850	2850	10.80	10.80	2680	2680	10.80	10.80	2680	2680	10.80	10.80
.96 %	0	7850	0.0	3390	3260	8830	0.0	3990	3690	7650	0.0	3230	3130	8530	0.0	3770	3550
Ar(in^2)	11	7730	0.2	3050	2930	8670	0.2	3600	3320	7520	0.2	2900	2820	8370	0.2	3400	3190
=12.48	13	7680	0.3	2670	2570	8600	0.3	3150	2910	7470	0.3	2540	2470	8310	0.3	2970	2790
	17	7550	0.4	2290	2200	8450	0.4	2700	2490	7340	0.4	2180	2110	8150	0.4	2550	2390
8-#11	21	7400	0.5	1910	1830	8250	0.5	2250	2080	7190	0.5	1820	1760	7960	0.5	2120	2000
4x-2y	25	7220	0.7	1140	1100	8030	0.7	1350	1250	7000	0.7	1090	1060	7730	0.7	1270	1200
	40	6320	0.9	381	366	6920	0.9	449	415	6100	0.9	363	352	6630	0.9	424	399
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2850	2850	10.80	10.80	2850	2850	10.80	10.80	2670	2670	10.80	10.80	2670	2670	10.80	10.80
1.96 %	0	8260	0.0	4040	3940	9240	0.0	4650	4370	8060	0.0	3880	3820	8940	0.0	4420	4230
Ar(in^2)	11	8120	0.2	3640	3550	9060	0.2	4180	3940	7910	0.2	3490	3440	8760	0.2	3980	3810
=25.40	13	8060	0.3	3180	3110	8990	0.3	3660	3440	7860	0.3	3060	3010	8690	0.3	3480	3330
	17	7930	0.4	2730	2660	8820	0.4	3140	2950	7720	0.4	2620	2580	8520	0.4	2990	2860
20-#10	21	7760	0.5	2270	2220	8610	0.5	2610	2460	7540	0.5	2180	2150	8310	0.5	2490	2380
6x-6y	25	7550	0.7	1360	1330	8360	0.7	1570	1480	7340	0.7	1310	1290	8060	0.7	1490	1430
	40	6570	0.9	454	443	7150	0.9	522	492	6350	0.9	436	429	6860	0.9	497	476
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2840	2840	10.80	10.80	2840	2840	10.80	10.80	2660	2660	10.80	10.80	2660	2660	10.80	10.80
2.89 %	0	8640	0.0	4780	4450	9620	0.0	5380	4870	8440	0.0	4620	4330	9320	0.0	5160	4740
Ar(in^2)	11	8490	0.2	4300	4000	9430	0.2	4840	4380	8280	0.2	4150	3890	9130	0.2	4640	4260
=37.44	13	8430	0.3	3760	3500	9350	0.3	4240	3840	8220	0.3	3630	3410	9050	0.3	4060	3730
	17	8280	0.4	3230	3000	9160	0.4	3630	3290	8060	0.4	3120	2920	8860	0.4	3480	3200
24-#11	21	8090	0.5	2690	2500	8930	0.5	3030	2740	7870	0.5	2600	2430	8630	0.5	2900	2670
8x-6y	25	7870	0.7	1610	1500	8660	0.7	1820	1640	7650	0.7	1560	1460	8360	0.7	1740	1600
	40	6790	0.9	537	500	7360	0.9	605	548	6570	0.9	519	486	7070	0.9	580	533
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2830	2830	10.80	10.80	2830	2830	10.80	10.80	2650	2650	10.80	10.80	2650	2650	10.80	10.80
3.70 %	0	8980	0.0	5300	5240	9950	0.0	5900	5660	8770	0.0	5140	5120	9650	0.0	5680	5520
Ar(in^2)	11	8810	0.2	4770	4720	9740	0.2	5310	5090	8600	0.2	4620	4610	9440	0.2	5110	4970
=48.00	13	8740	0.3	4170	4130	9660	0.3	4650	4460	8530	0.3	4050	4030	9360	0.3	4470	4350
	17	8580	0.4	3580	3540	9460	0.4	3980	3820	8370	0.4	3470	3450	9160	0.4	3830	3730
12-#18	21	8380	0.5	2980	2950	9220	0.5	3320	3180	8160	0.5	2890	2880	8920	0.5	3200	3110
4x-4y	25	8140	0.7	1790	1770	8930	0.7	1990	1910	7920	0.7	1730	1730	8630	0.7	1920	1860
	40	6990	0.9	596	589	7540	0.9	664	636	6750	0.9	578	575	7240	0.9	639	621
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2820	2820	10.80	10.80	2820	2820	10.80	10.80	2640	2640	10.80	10.80	2640	2640	10.80	10.80

Notes : 1. Cex = $Pex(KxLx)^2/10000.$ (kip-ft^2), Cey = $Pey(KyLy)^2/10000.$ (kip-ft^2), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 8.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) — Column Size(b x h): 36 x 36

Designation		W 12 x230								W 12 x210							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.48 %	0	7280	0.0	2680	2700	8090	0.0	3180	3110	7120	0.0	2560	2590	7860	0.0	3020	2990
Ar(in²)	11	7160	0.2	2410	2430	7930	0.2	2860	2800	7000	0.2	2310	2330	7710	0.2	2720	2690
= 6.24	13	7110	0.3	2110	2130	7870	0.3	2510	2450	6950	0.3	2020	2040	7650	0.3	2380	2350
	17	6990	0.4	1810	1820	7730	0.4	2150	2100	6830	0.4	1730	1750	7500	0.4	2040	2020
4-#11	21	6840	0.5	1510	1520	7540	0.5	1790	1750	6680	0.5	1440	1460	7320	0.5	1700	1680
2x-2y	25	6660	0.7	904	911	7330	0.7	1070	1050	6500	0.7	865	875	7110	0.7	1020	1010
	40	5810	0.9	301	303	6290	0.9	357	349	5640	0.9	288	291	6070	0.9	339	336
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2530	2530	10.80	10.80	2530	2530	10.80	10.80	2400	2400	10.80	10.80	2400	2400	10.80	10.80
.96 %	0	7480	0.0	3100	3020	8280	0.0	3600	3430	7320	0.0	2980	2920	8060	0.0	3440	3310
Ar(in²)	11	7350	0.2	2790	2720	8120	0.2	3240	3080	7190	0.2	2680	2630	7900	0.2	3090	2980
=12.48	13	7300	0.3	2440	2380	8060	0.3	2830	2700	7140	0.3	2350	2300	7830	0.3	2710	2610
	17	7170	0.4	2090	2040	7910	0.4	2430	2310	7010	0.4	2010	1970	7680	0.4	2320	2230
8-#11	21	7010	0.5	1740	1700	7710	0.5	2020	1930	6850	0.5	1680	1640	7490	0.5	1930	1860
4x-2y	25	6830	0.7	1050	1020	7490	0.7	1210	1160	6660	0.7	1010	984	7270	0.7	1160	1120
	40	5920	0.9	348	340	6400	0.9	404	385	5760	0.9	335	328	6180	0.9	386	372
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2530	2530	10.80	10.80	2530	2530	10.80	10.80	2400	2400	10.80	10.80	2400	2400	10.80	10.80
1.96 %	0	7890	0.0	3750	3710	8690	0.0	4250	4110	7730	0.0	3630	3610	8470	0.0	4090	3990
Ar(in²)	11	7740	0.2	3380	3340	8520	0.2	3820	3700	7580	0.2	3270	3250	8290	0.2	3680	3590
=25.40	13	7680	0.3	2950	2920	8450	0.3	3350	3240	7520	0.3	2860	2840	8220	0.3	3220	3150
	17	7540	0.4	2530	2510	8280	0.4	2870	2780	7380	0.4	2450	2430	8050	0.4	2760	2700
20-#10	21	7370	0.5	2110	2090	8060	0.5	2390	2310	7200	0.5	2040	2030	7840	0.5	2300	2250
6x-6y	25	7160	0.7	1270	1250	7820	0.7	1430	1390	7000	0.7	1230	1220	7590	0.7	1380	1350
	40	6160	0.9	421	417	6620	0.9	477	462	5990	0.9	408	405	6400	0.9	459	449
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2520	2520	10.80	10.80	2520	2520	10.80	10.80	2390	2390	10.80	10.80	2390	2390	10.80	10.80
2.89 %	0	8270	0.0	4490	4230	9070	0.0	4980	4620	8110	0.0	4370	4150	8850	0.0	4820	4500
Ar(in²)	11	8110	0.2	4040	3810	8880	0.2	4480	4160	7950	0.2	3930	3740	8650	0.2	4340	4050
=37.44	13	8040	0.3	3530	3330	8800	0.3	3920	3640	7880	0.3	3440	3270	8580	0.3	3800	3540
	17	7890	0.4	3030	2860	8620	0.4	3360	3120	7730	0.4	2950	2800	8390	0.4	3250	3040
24-#11	21	7700	0.5	2520	2380	8390	0.5	2800	2600	7530	0.5	2460	2340	8160	0.5	2710	2530
8x-6y	25	7470	0.7	1510	1430	8120	0.7	1680	1560	7300	0.7	1470	1400	7890	0.7	1630	1520
	40	6380	0.9	504	476	6820	0.9	560	519	6200	0.9	491	467	6600	0.9	542	506
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2510	2510	10.80	10.80	2510	2510	10.80	10.80	2380	2380	10.80	10.80	2380	2380	10.80	10.80
3.70 %	0	8600	0.0	5010	5020	9410	0.0	5510	5400	8440	0.0	4890	4920	9180	0.0	5340	5290
Ar(in²)	11	8430	0.2	4510	4520	9200	0.2	4960	4860	8270	0.2	4400	4430	8970	0.2	4810	4760
=48.00	13	8360	0.3	3950	3960	9120	0.3	4340	4260	8200	0.3	3850	3870	8890	0.3	4210	4160
	17	8190	0.4	3380	3390	8920	0.4	3720	3650	8030	0.4	3300	3320	8690	0.4	3610	3570
12-#18	21	7980	0.5	2820	2830	8670	0.5	3100	3040	7820	0.5	2750	2770	8440	0.5	3010	2970
4x-4y	25	7740	0.7	1690	1700	8380	0.7	1860	1820	7570	0.7	1650	1660	8150	0.7	1800	1780
	40	6560	0.9	563	565	6990	0.9	619	607	6380	0.9	550	553	6760	0.9	601	594
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2500	2500	10.80	10.80	2500	2500	10.80	10.80	2370	2370	10.80	10.80	2370	2370	10.80	10.80

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 8.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 36 x 36

Designation		W 12 x190								W							
Fy (ksi)		36				50											
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy								
.48 %	0	6960	0.0	2440	2480	7630	0.0	2860	2860								
Ar(in²)	11	6840	0.2	2200	2230	7480	0.2	2570	2580								
= 6.24	13	6790	0.3	1930	1950	7420	0.3	2250	2250								
	17	6670	0.4	1650	1670	7270	0.4	1930	1930								
4-#11	21	6520	0.5	1380	1390	7090	0.5	1610	1610								
2x-2y	25	6340	0.7	825	836	6880	0.7	965	966								
	40	5470	0.9	275	278	5850	0.9	321	322								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2270	2270	10.80	10.80	2270	2270	10.80	10.80								
.96 %	0	7160	0.0	2860	2800	7830	0.0	3280	3180								
Ar(in²)	11	7030	0.2	2580	2520	7670	0.2	2950	2860								
=12.48	13	6980	0.3	2250	2210	7600	0.3	2580	2510								
	17	6850	0.4	1930	1890	7450	0.4	2210	2150								
8-#11	21	6690	0.5	1610	1580	7260	0.5	1840	1790								
4x-2y	25	6500	0.7	966	945	7040	0.7	1110	1070								
	40	5580	0.9	322	315	5960	0.9	368	358								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2260	2260	10.80	10.80	2260	2260	10.80	10.80								
1.96 %	0	7570	0.0	3510	3490	8230	0.0	3930	3870								
Ar(in²)	11	7420	0.2	3160	3140	8060	0.2	3530	3480								
=25.40	13	7360	0.3	2770	2750	7990	0.3	3090	3050								
	17	7220	0.4	2370	2360	7820	0.4	2650	2610								
20-#10	21	7040	0.5	1980	1960	7610	0.5	2210	2180								
6x-6y	25	6830	0.7	1190	1180	7360	0.7	1330	1310								
	40	5810	0.9	395	392	6170	0.9	441	435								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2250	2250	10.80	10.80	2250	2250	10.80	10.80								
2.89 %	0	7950	0.0	4250	4070	8620	0.0	4660	4380								
Ar(in²)	11	7790	0.2	3830	3660	8420	0.2	4200	3940								
=37.44	13	7720	0.3	3350	3200	8340	0.3	3670	3450								
	17	7560	0.4	2870	2740	8160	0.4	3150	2950								
24-#11	21	7360	0.5	2390	2290	7930	0.5	2620	2460								
8x-6y	25	7130	0.7	1430	1370	7650	0.7	1570	1480								
	40	6010	0.9	478	457	6370	0.9	524	492								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2240	2240	10.80	10.80	2240	2240	10.80	10.80								
3.70 %	0	8290	0.0	4770	4810	8950	0.0	5180	5170								
Ar(in²)	11	8100	0.2	4300	4330	8740	0.2	4670	4650								
=48.00	13	8030	0.3	3760	3790	8660	0.3	4080	4070								
	17	7860	0.4	3220	3240	8450	0.4	3500	3490								
12-#18	21	7640	0.5	2690	2700	8200	0.5	2920	2910								
4x-4y	25	7390	0.7	1610	1620	7910	0.7	1750	1740								
	40	6190	0.9	537	540	6530	0.9	583	581								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2240	2240	10.80	10.80	2240	2240	10.80	10.80								

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85   f'c : 8.0 ksi NW
φb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 32 x 36

Designation		W 14 x426								W 14 x398							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	8210	0.0	3890	3200	9700	0.0	4910	3780	8000	0.0	3700	3090	9390	0.0	4640	3640
Ar(in²)	11	8080	0.2	3500	2880	9510	0.2	4420	3400	7860	0.2	3330	2780	9210	0.2	4170	3270
= 6.24	13	8020	0.3	3070	2520	9440	0.3	3870	2970	7810	0.3	2910	2430	9130	0.3	3650	2870
	17	7890	0.4	2630	2160	9250	0.4	3310	2550	7680	0.4	2500	2080	8950	0.4	3130	2460
4-#11	21	7730	0.5	2190	1800	9030	0.5	2760	2120	7520	0.5	2080	1740	8730	0.5	2610	2050
2x-2y	25	7530	0.7	1310	1080	8760	0.7	1660	1270	7320	0.7	1250	1040	8470	0.7	1570	1230
	40	6580	0.9	438	359	7470	0.9	552	424	6380	0.9	415	347	7200	0.9	521	409
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		3700	2930	10.80	9.60	3700	2930	10.80	9.60	3520	2790	10.80	9.60	3520	2790	10.80	9.60
1.04 %	0	8390	0.0	4240	3470	9880	0.0	5260	4050	8180	0.0	4050	3360	9570	0.0	4990	3910
Ar(in²)	11	8250	0.2	3820	3130	9690	0.2	4730	3650	8040	0.2	3640	3030	9380	0.2	4490	3520
=12.00	13	8200	0.3	3340	2740	9610	0.3	4140	3190	7980	0.3	3190	2650	9300	0.3	3930	3080
	17	8060	0.4	2860	2350	9420	0.4	3550	2730	7850	0.4	2730	2270	9120	0.4	3370	2640
12-# 9	21	7890	0.5	2390	1950	9180	0.5	2960	2280	7680	0.5	2280	1890	8890	0.5	2810	2200
4x-4y	25	7680	0.7	1430	1170	8910	0.7	1770	1370	7470	0.7	1370	1130	8610	0.7	1680	1320
	40	6690	0.9	477	390	7570	0.9	591	455	6490	0.9	455	378	7300	0.9	561	440
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		3700	2920	10.80	9.60	3700	2920	10.80	9.60	3520	2780	10.80	9.60	3520	2780	10.80	9.60
2.08 %	0	8770	0.0	4800	4040	10300	0.0	5810	4620	8560	0.0	4610	3930	9950	0.0	5540	4480
Ar(in²)	11	8620	0.2	4320	3640	10000	0.2	5230	4160	8410	0.2	4150	3540	9740	0.2	4990	4030
=24.00	13	8560	0.3	3780	3190	9970	0.3	4580	3640	8340	0.3	3630	3100	9660	0.3	4360	3530
	17	8410	0.4	3240	2730	9760	0.4	3920	3120	8190	0.4	3110	2650	9460	0.4	3740	3030
24-# 9	21	8220	0.5	2700	2280	9510	0.5	3270	2600	8010	0.5	2590	2210	9210	0.5	3120	2520
6x-8y	25	8000	0.7	1620	1370	9210	0.7	1960	1560	7790	0.7	1560	1330	8910	0.7	1870	1510
	40	6920	0.9	540	455	7780	0.9	653	519	6710	0.9	518	442	7500	0.9	623	504
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		3690	2920	10.80	9.60	3690	2920	10.80	9.60	3510	2770	10.80	9.60	3510	2770	10.80	9.60
3.13 %	0	9150	0.0	5700	4400	10600	0.0	6710	4970	8940	0.0	5500	4290	10300	0.0	6440	4840
Ar(in²)	11	8980	0.2	5130	3960	10400	0.2	6040	4480	8770	0.2	4950	3860	10100	0.2	5790	4350
=36.00	13	8920	0.3	4490	3470	10300	0.3	5280	3920	8700	0.3	4330	3380	10000	0.3	5070	3810
	17	8750	0.4	3850	2970	10100	0.4	4530	3360	8540	0.4	3710	2900	9800	0.4	4350	3270
16-#14	21	8550	0.5	3210	2480	9830	0.5	3770	2800	8340	0.5	3090	2410	9530	0.5	3620	2720
6x-4y	25	8310	0.7	1920	1490	9510	0.7	2260	1680	8090	0.7	1860	1450	9210	0.7	2170	1630
	40	7140	0.9	641	495	7980	0.9	754	559	6930	0.9	618	482	7700	0.9	724	544
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		3680	2910	10.80	9.60	3680	2910	10.80	9.60	3500	2770	10.80	9.60	3500	2770	10.80	9.60
3.91 %	0	9440	0.0	5980	4910	10900	0.0	6980	5480	9230	0.0	5780	4800	10600	0.0	6710	5350
Ar(in²)	11	9260	0.2	5380	4420	10700	0.2	6280	4930	9040	0.2	5200	4320	10400	0.2	6040	4810
=45.00	13	9190	0.3	4710	3870	10600	0.3	5500	4320	8970	0.3	4550	3780	10300	0.3	5280	4210
	17	9010	0.4	4030	3320	10400	0.4	4710	3700	8800	0.4	3900	3240	10100	0.4	4530	3610
20-#14	21	8790	0.5	3360	2760	10100	0.5	3930	3080	8580	0.5	3250	2700	9770	0.5	3770	3010
6x-6y	25	8540	0.7	2020	1660	9730	0.7	2360	1850	8320	0.7	1950	1620	9430	0.7	2260	1800
	40	7300	0.9	672	552	8120	0.9	785	616	7090	0.9	650	540	7840	0.9	754	601
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		3670	2900	10.80	9.60	3670	2900	10.80	9.60	3490	2760	10.80	9.60	3490	2760	10.80	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²),   Cey = Pey(KyLy)²/10000. (kip-ft²),   KL in ft,   rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 36

Designation		W 14 x370								W 14 x342							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.54 %	0	7790	0.0	3510	2970	9090	0.0	4370	3500	7580	0.0	3320	2850	8780	0.0	4110	3360
Ar(in²)	11	7650	0.2	3150	2670	8900	0.2	3940	3150	7440	0.2	2980	2570	8600	0.2	3700	3020
= 6.24	13	7600	0.3	2760	2340	8830	0.3	3440	2760	7390	0.3	2610	2240	8530	0.3	3240	2640
	17	7470	0.4	2370	2010	8650	0.4	2950	2360	7260	0.4	2240	1920	8350	0.4	2780	2270
4-#11	21	7310	0.5	1970	1670	8430	0.5	2460	1970	7090	0.5	1860	1600	8130	0.5	2310	1890
2x-2y	25	7110	0.7	1180	1000	8170	0.7	1480	1180	6900	0.7	1120	962	7880	0.7	1390	1130
	40	6170	0.9	394	334	6930	0.9	492	393	5970	0.9	372	320	6660	0.9	462	377
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		3350	2640	10.80	9.60	3350	2640	10.80	9.60	3170	2500	10.80	9.60	3170	2500	10.80	9.60
1.04 %	0	7970	0.0	3860	3250	9270	0.0	4720	3780	7760	0.0	3670	3130	8960	0.0	4460	3630
Ar(in²)	11	7830	0.2	3470	2920	9080	0.2	4250	3400	7620	0.2	3300	2820	8770	0.2	4020	3270
=12.00	13	7770	0.3	3040	2560	9000	0.3	3720	2970	7560	0.3	2890	2460	8700	0.3	3510	2860
	17	7640	0.4	2600	2190	8820	0.4	3190	2550	7420	0.4	2470	2110	8510	0.4	3010	2450
12-# 9	21	7460	0.5	2170	1830	8590	0.5	2660	2120	7250	0.5	2060	1760	8290	0.5	2510	2040
4x-4y	25	7260	0.7	1300	1100	8320	0.7	1590	1270	7050	0.7	1240	1060	8020	0.7	1510	1230
	40	6280	0.9	433	365	7030	0.9	531	424	6070	0.9	412	352	6750	0.9	501	408
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		3340	2640	10.80	9.60	3340	2640	10.80	9.60	3160	2500	10.80	9.60	3160	2500	10.80	9.60
2.08 %	0	8350	0.0	4420	3820	9650	0.0	5280	4340	8140	0.0	4230	3700	9340	0.0	5020	4200
Ar(in²)	11	8190	0.2	3980	3440	9440	0.2	4750	3910	7980	0.2	3800	3330	9130	0.2	4510	3780
=24.00	13	8130	0.3	3480	3010	9360	0.3	4160	3420	7920	0.3	3330	2910	9050	0.3	3950	3310
	17	7980	0.4	2980	2580	9160	0.4	3560	2930	7770	0.4	2850	2500	8850	0.4	3390	2840
24-# 9	21	7790	0.5	2480	2150	8910	0.5	2970	2440	7580	0.5	2380	2080	8610	0.5	2820	2360
6x-8y	25	7570	0.7	1490	1290	8620	0.7	1780	1470	7360	0.7	1430	1250	8320	0.7	1690	1420
	40	6500	0.9	496	429	7230	0.9	593	488	6290	0.9	475	416	6950	0.9	564	472
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		3330	2630	10.80	9.60	3330	2630	10.80	9.60	3150	2490	10.80	9.60	3150	2490	10.80	9.60
3.13 %	0	8730	0.0	5310	4180	10000	0.0	6180	4700	8520	0.0	5120	4060	9720	0.0	5910	4560
Ar(in²)	11	8560	0.2	4780	3760	9800	0.2	5560	4230	8340	0.2	4610	3650	9490	0.2	5320	4100
=36.00	13	8490	0.3	4180	3290	9710	0.3	4860	3700	8280	0.3	4030	3200	9410	0.3	4660	3590
	17	8330	0.4	3580	2820	9500	0.4	4170	3170	8110	0.4	3460	2740	9190	0.4	3990	3080
16-#14	21	8120	0.5	2990	2350	9230	0.5	3470	2640	7910	0.5	2880	2280	8930	0.5	3330	2560
6x-4y	25	7880	0.7	1790	1410	8910	0.7	2080	1590	7660	0.7	1730	1370	8620	0.7	2000	1540
	40	6720	0.9	597	469	7420	0.9	694	528	6500	0.9	575	456	7140	0.9	665	512
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		3320	2620	10.80	9.60	3320	2620	10.80	9.60	3140	2480	10.80	9.60	3140	2480	10.80	9.60
3.91 %	0	9010	0.0	5590	4690	10300	0.0	6450	5210	8800	0.0	5400	4570	10000	0.0	6180	5070
Ar(in²)	11	8830	0.2	5030	4220	10100	0.2	5800	4690	8620	0.2	4860	4120	9770	0.2	5570	4560
=45.00	13	8760	0.3	4400	3690	9980	0.3	5080	4100	8550	0.3	4260	3600	9670	0.3	4870	3990
	17	8580	0.4	3770	3170	9750	0.4	4350	3520	8370	0.4	3650	3090	9440	0.4	4170	3420
20-#14	21	8360	0.5	3150	2640	9470	0.5	3630	2930	8150	0.5	3040	2570	9160	0.5	3480	2850
6x-6y	25	8110	0.7	1890	1580	9130	0.7	2180	1760	7890	0.7	1820	1540	8830	0.7	2090	1710
	40	6870	0.9	629	527	7560	0.9	725	585	6650	0.9	607	514	7280	0.9	695	570
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		3320	2620	10.80	9.60	3320	2620	10.80	9.60	3140	2480	10.80	9.60	3140	2480	10.80	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 36

Designation		W 14 x311								W 14 x283							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	7320	0.0	3110	2720	8410	0.0	3830	3200	7110	0.0	2930	2590	8100	0.0	3580	3040
Ar(in²)	11	7190	0.2	2800	2440	8230	0.2	3450	2880	6970	0.2	2630	2330	7920	0.2	3220	2740
= 6.24	13	7130	0.3	2450	2140	8160	0.3	3020	2520	6920	0.3	2310	2040	7850	0.3	2820	2400
	17	7000	0.4	2100	1830	7990	0.4	2580	2160	6790	0.4	1980	1740	7680	0.4	2420	2060
4-#11	21	6840	0.5	1750	1530	7780	0.5	2150	1800	6620	0.5	1650	1450	7470	0.5	2010	1710
2x-2y	25	6650	0.7	1050	916	7530	0.7	1290	1080	6430	0.7	987	872	7230	0.7	1210	1030
	40	5720	0.9	349	305	6330	0.9	430	359	5500	0.9	329	290	6050	0.9	402	342
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2950	2330	10.80	9.60	2950	2330	10.80	9.60	2770	2190	10.80	9.60	2770	2190	10.80	9.60
1.04 %	0	7500	0.0	3460	2990	8590	0.0	4180	3470	7290	0.0	3280	2870	8280	0.0	3930	3320
Ar(in²)	11	7360	0.2	3110	2690	8400	0.2	3760	3130	7150	0.2	2950	2580	8100	0.2	3540	2990
=12.00	13	7300	0.3	2720	2360	8330	0.3	3290	2730	7090	0.3	2580	2260	8020	0.3	3090	2620
	17	7170	0.4	2340	2020	8150	0.4	2820	2340	6950	0.4	2210	1930	7850	0.4	2650	2240
12-# 9	21	7000	0.5	1950	1680	7930	0.5	2350	1950	6780	0.5	1840	1610	7630	0.5	2210	1870
4x-4y	25	6800	0.7	1170	1010	7670	0.7	1410	1170	6580	0.7	1110	967	7370	0.7	1330	1120
	40	5820	0.9	389	336	6420	0.9	470	390	5600	0.9	368	322	6140	0.9	442	373
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2950	2330	10.80	9.60	2950	2330	10.80	9.60	2770	2190	10.80	9.60	2770	2190	10.80	9.60
2.08 %	0	7880	0.0	4020	3570	8970	0.0	4730	4040	7670	0.0	3840	3440	8660	0.0	4490	3890
Ar(in²)	11	7730	0.2	3620	3210	8770	0.2	4260	3640	7510	0.2	3460	3100	8460	0.2	4040	3500
=24.00	13	7660	0.3	3170	2810	8690	0.3	3730	3180	7450	0.3	3030	2710	8380	0.3	3530	3070
	17	7510	0.4	2710	2410	8490	0.4	3200	2730	7290	0.4	2590	2320	8180	0.4	3030	2630
24-# 9	21	7320	0.5	2260	2010	8250	0.5	2660	2270	7100	0.5	2160	1930	7940	0.5	2520	2190
6x-8y	25	7100	0.7	1360	1200	7960	0.7	1600	1360	6880	0.7	1300	1160	7660	0.7	1510	1310
	40	6030	0.9	452	401	6620	0.9	532	454	5810	0.9	432	386	6330	0.9	504	437
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2940	2320	10.80	9.60	2940	2320	10.80	9.60	2760	2180	10.80	9.60	2760	2180	10.80	9.60
3.13 %	0	8260	0.0	4910	3930	9350	0.0	5630	4400	8050	0.0	4730	3800	9040	0.0	5380	4250
Ar(in²)	11	8090	0.2	4420	3530	9130	0.2	5070	3960	7870	0.2	4260	3420	8820	0.2	4840	3830
=36.00	13	8020	0.3	3870	3090	9040	0.3	4430	3460	7800	0.3	3730	2990	8730	0.3	4240	3350
	17	7850	0.4	3320	2650	8830	0.4	3800	2970	7630	0.4	3190	2560	8520	0.4	3630	2870
16-#14	21	7650	0.5	2760	2210	8560	0.5	3170	2470	7420	0.5	2660	2140	8260	0.5	3030	2390
6x-4y	25	7400	0.7	1660	1320	8260	0.7	1900	1480	7180	0.7	1600	1280	7950	0.7	1820	1430
	40	6240	0.9	552	441	6800	0.9	633	494	6010	0.9	532	427	6510	0.9	605	478
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2930	2310	10.80	9.60	2930	2310	10.80	9.60	2750	2170	10.80	9.60	2750	2170	10.80	9.60
3.91 %	0	8550	0.0	5200	4440	9630	0.0	5900	4910	8330	0.0	5020	4310	9320	0.0	5650	4760
Ar(in²)	11	8360	0.2	4680	4000	9400	0.2	5310	4420	8140	0.2	4520	3880	9090	0.2	5090	4290
=45.00	13	8290	0.3	4100	3500	9310	0.3	4650	3870	8070	0.3	3960	3400	9000	0.3	4450	3750
	17	8110	0.4	3510	3000	9080	0.4	3980	3310	7890	0.4	3390	2910	8770	0.4	3820	3210
20-#14	21	7890	0.5	2930	2500	8800	0.5	3320	2760	7660	0.5	2830	2430	8490	0.5	3180	2680
6x-6y	25	7630	0.7	1760	1500	8470	0.7	1990	1660	7400	0.7	1700	1460	8170	0.7	1910	1610
	40	6380	0.9	585	499	6930	0.9	663	552	6150	0.9	565	485	6640	0.9	636	535
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2920	2310	10.80	9.60	2920	2310	10.80	9.60	2740	2160	10.80	9.60	2740	2160	10.80	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 8.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 32 x 36

Designation		W 14 x257								W 14 x233							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.54 %	0	6900	0.0	2760	2460	7800	0.0	3350	2900	6710	0.0	2610	2330	7530	0.0	3140	2760
Ar(in²)	11	6770	0.2	2480	2210	7630	0.2	3010	2610	6580	0.2	2350	2100	7360	0.2	2820	2480
= 6.24	13	6710	0.3	2170	1940	7560	0.3	2640	2280	6520	0.3	2050	1840	7290	0.3	2470	2170
	17	6580	0.4	1860	1660	7390	0.4	2260	1960	6390	0.4	1760	1580	7120	0.4	2120	1860
4-#11	21	6420	0.5	1550	1380	7180	0.5	1880	1630	6220	0.5	1470	1310	6920	0.5	1770	1550
2x-2y	25	6220	0.7	931	829	6940	0.7	1130	978	6030	0.7	879	787	6680	0.7	1060	930
	40	5300	0.9	310	276	5780	0.9	376	326	5100	0.9	293	262	5530	0.9	353	310
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2600	2050	10.80	9.60	2600	2050	10.80	9.60	2440	1930	10.80	9.60	2440	1930	10.80	9.60
1.04 %	0	7080	0.0	3110	2740	7980	0.0	3700	3180	6900	0.0	2960	2620	7710	0.0	3490	3030
Ar(in²)	11	6940	0.2	2800	2460	7800	0.2	3330	2860	6750	0.2	2660	2350	7530	0.2	3140	2730
=12.00	13	6880	0.3	2450	2160	7730	0.3	2910	2500	6690	0.3	2330	2060	7460	0.3	2750	2390
	17	6740	0.4	2100	1850	7550	0.4	2500	2140	6550	0.4	2000	1770	7280	0.4	2350	2050
12-# 9	21	6570	0.5	1750	1540	7340	0.5	2080	1790	6380	0.5	1660	1470	7070	0.5	1960	1710
4x-4y	25	6370	0.7	1050	924	7080	0.7	1250	1070	6180	0.7	997	882	6820	0.7	1180	1020
	40	5400	0.9	349	308	5870	0.9	416	357	5200	0.9	332	294	5620	0.9	392	341
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2590	2050	10.80	9.60	2590	2050	10.80	9.60	2430	1920	10.80	9.60	2430	1920	10.80	9.60
2.08 %	0	7460	0.0	3670	3310	8360	0.0	4260	3750	7280	0.0	3520	3190	8090	0.0	4050	3610
Ar(in²)	11	7300	0.2	3310	2980	8160	0.2	3830	3370	7110	0.2	3170	2870	7890	0.2	3640	3250
=24.00	13	7240	0.3	2890	2610	8080	0.3	3350	2950	7050	0.3	2770	2510	7810	0.3	3190	2840
	17	7090	0.4	2480	2240	7890	0.4	2870	2530	6890	0.4	2380	2150	7620	0.4	2730	2430
24-# 9	21	6890	0.5	2070	1860	7650	0.5	2390	2110	6700	0.5	1980	1800	7380	0.5	2280	2030
6x-8y	25	6670	0.7	1240	1120	7370	0.7	1440	1260	6470	0.7	1190	1080	7100	0.7	1370	1220
	40	5600	0.9	413	372	6060	0.9	478	421	5390	0.9	396	359	5800	0.9	455	405
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2580	2040	10.80	9.60	2580	2040	10.80	9.60	2420	1920	10.80	9.60	2420	1920	10.80	9.60
3.13 %	0	7840	0.0	4560	3670	8740	0.0	5150	4110	7660	0.0	4420	3560	8470	0.0	4940	3970
Ar(in²)	11	7670	0.2	4110	3310	8520	0.2	4640	3700	7470	0.2	3980	3200	8250	0.2	4450	3570
=36.00	13	7600	0.3	3590	2890	8440	0.3	4060	3230	7400	0.3	3480	2800	8160	0.3	3890	3120
	17	7420	0.4	3080	2480	8220	0.4	3480	2770	7230	0.4	2980	2400	7950	0.4	3340	2680
16-#14	21	7210	0.5	2570	2070	7960	0.5	2900	2310	7020	0.5	2490	2000	7690	0.5	2780	2230
6x-4y	25	6970	0.7	1540	1240	7660	0.7	1740	1390	6770	0.7	1490	1200	7390	0.7	1670	1340
	40	5790	0.9	513	413	6230	0.9	579	461	5580	0.9	497	400	5970	0.9	555	446
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2570	2030	10.80	9.60	2570	2030	10.80	9.60	2420	1910	10.80	9.60	2420	1910	10.80	9.60
3.91 %	0	8130	0.0	4860	4190	9030	0.0	5430	4620	7940	0.0	4710	4070	8750	0.0	5220	4480
Ar(in²)	11	7940	0.2	4370	3770	8790	0.2	4880	4160	7740	0.2	4240	3670	8520	0.2	4700	4030
=45.00	13	7860	0.3	3830	3300	8700	0.3	4270	3640	7670	0.3	3710	3210	8430	0.3	4110	3530
	17	7680	0.4	3280	2830	8470	0.4	3660	3120	7480	0.4	3180	2750	8200	0.4	3520	3020
20-#14	21	7450	0.5	2730	2360	8200	0.5	3050	2600	7250	0.5	2650	2290	7920	0.5	2930	2520
6x-6y	25	7180	0.7	1640	1410	7870	0.7	1830	1560	6980	0.7	1590	1370	7600	0.7	1760	1510
	40	5930	0.9	546	471	6360	0.9	610	519	5720	0.9	529	458	6090	0.9	586	503
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2570	2030	10.80	9.60	2570	2030	10.80	9.60	2410	1900	10.80	9.60	2410	1900	10.80	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 8.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 36

Designation		W 14 x211								W 14 x193							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.54 %	0	6540	0.0	2470	2220	7280	0.0	2950	2620	6400	0.0	2360	2120	7080	0.0	2800	2500
Ar(in²)	11	6400	0.2	2220	1990	7110	0.2	2650	2360	6260	0.2	2120	1910	6910	0.2	2520	2250
= 6.24	13	6350	0.3	1940	1750	7040	0.3	2320	2060	6210	0.3	1860	1670	6840	0.3	2200	1970
	17	6210	0.4	1670	1500	6870	0.4	1990	1770	6070	0.4	1590	1430	6680	0.4	1890	1690
4-#11	21	6050	0.5	1390	1250	6670	0.5	1660	1470	5910	0.5	1330	1190	6470	0.5	1570	1410
2x-2y	25	5850	0.7	832	748	6430	0.7	995	883	5710	0.7	796	714	6240	0.7	944	844
	40	4920	0.9	277	249	5300	0.9	331	294	4780	0.9	265	238	5120	0.9	314	281
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2290	1810	10.80	9.60	2290	1810	10.80	9.60	2180	1720	10.80	9.60	2180	1720	10.80	9.60
1.04 %	0	6720	0.0	2820	2500	7460	0.0	3300	2900	6590	0.0	2710	2400	7260	0.0	3150	2780
Ar(in²)	11	6580	0.2	2540	2250	7280	0.2	2970	2610	6440	0.2	2440	2160	7080	0.2	2840	2510
=12.00	13	6520	0.3	2220	1970	7210	0.3	2600	2280	6380	0.3	2130	1890	7010	0.3	2480	2190
	17	6380	0.4	1900	1690	7040	0.4	2230	1960	6240	0.4	1830	1620	6840	0.4	2130	1880
12-# 9	21	6200	0.5	1590	1410	6820	0.5	1860	1630	6060	0.5	1520	1350	6620	0.5	1770	1570
4x-4y	25	6000	0.7	951	843	6570	0.7	1110	978	5850	0.7	914	809	6380	0.7	1060	939
	40	5020	0.9	317	281	5390	0.9	371	326	4870	0.9	304	269	5200	0.9	354	313
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2290	1810	10.80	9.60	2290	1810	10.80	9.60	2170	1720	10.80	9.60	2170	1720	10.80	9.60
2.08 %	0	7100	0.0	3380	3080	7840	0.0	3860	3470	6970	0.0	3280	2980	7640	0.0	3710	3360
Ar(in²)	11	6940	0.2	3050	2770	7640	0.2	3470	3120	6800	0.2	2950	2680	7440	0.2	3340	3020
=24.00	13	6870	0.3	2670	2420	7560	0.3	3040	2730	6730	0.3	2580	2340	7360	0.3	2920	2650
	17	6720	0.4	2280	2080	7370	0.4	2600	2340	6570	0.4	2210	2010	7170	0.4	2500	2270
24-# 9	21	6520	0.5	1900	1730	7130	0.5	2170	1950	6380	0.5	1840	1670	6930	0.5	2090	1890
6x-8y	25	6290	0.7	1140	1040	6860	0.7	1300	1170	6140	0.7	1110	1000	6660	0.7	1250	1130
	40	5210	0.9	380	345	5560	0.9	433	390	5050	0.9	368	334	5370	0.9	417	377
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2280	1800	10.80	9.60	2280	1800	10.80	9.60	2160	1710	10.80	9.60	2160	1710	10.80	9.60
3.13 %	0	7480	0.0	4280	3470	8220	0.0	4750	3830	7340	0.0	4170	3390	8020	0.0	4600	3720
Ar(in²)	11	7300	0.2	3850	3120	8000	0.2	4280	3450	7160	0.2	3760	3050	7800	0.2	4140	3350
=36.00	13	7230	0.3	3370	2730	7910	0.3	3740	3020	7090	0.3	3290	2670	7710	0.3	3620	2930
	17	7050	0.4	2890	2340	7700	0.4	3210	2590	6910	0.4	2820	2290	7500	0.4	3110	2510
16-#14	21	6830	0.5	2410	1950	7440	0.5	2670	2160	6690	0.5	2350	1910	7240	0.5	2590	2090
6x-4y	25	6580	0.7	1440	1170	7140	0.7	1600	1290	6430	0.7	1410	1140	6940	0.7	1550	1250
	40	5390	0.9	481	389	5730	0.9	534	431	5230	0.9	469	381	5530	0.9	517	418
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2270	1790	10.80	9.60	2270	1790	10.80	9.60	2150	1700	10.80	9.60	2150	1700	10.80	9.60
3.91 %	0	7770	0.0	4570	3980	8510	0.0	5030	4350	7630	0.0	4470	3900	8310	0.0	4880	4230
Ar(in²)	11	7570	0.2	4120	3580	8270	0.2	4530	3910	7430	0.2	4020	3510	8070	0.2	4400	3810
=45.00	13	7490	0.3	3600	3130	8170	0.3	3960	3420	7350	0.3	3520	3070	7970	0.3	3850	3330
	17	7300	0.4	3090	2690	7950	0.4	3400	2930	7160	0.4	3010	2640	7750	0.4	3300	2860
20-#14	21	7070	0.5	2570	2240	7670	0.5	2830	2440	6920	0.5	2510	2200	7470	0.5	2750	2380
6x-6y	25	6800	0.7	1540	1340	7350	0.7	1700	1470	6640	0.7	1510	1320	7140	0.7	1650	1430
	40	5520	0.9	514	447	5850	0.9	565	488	5350	0.9	502	439	5650	0.9	549	476
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2260	1790	10.80	9.60	2260	1790	10.80	9.60	2150	1700	10.80	9.60	2150	1700	10.80	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 36

Designation		W 14 x176								W 14 x159							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	6270	0.0	2260	2020	6890	0.0	2660	2390	6140	0.0	2150	1910	6690	0.0	2520	2270
Ar(in²)	11	6130	0.2	2030	1810	6720	0.2	2390	2150	5990	0.2	1940	1720	6520	0.2	2260	2040
= 6.24	13	6070	0.3	1780	1590	6650	0.3	2090	1880	5940	0.3	1700	1500	6450	0.3	1980	1780
	17	5940	0.4	1520	1360	6490	0.4	1790	1610	5800	0.4	1450	1290	6290	0.4	1700	1530
4-#11	21	5770	0.5	1270	1130	6280	0.5	1490	1340	5630	0.5	1210	1070	6090	0.5	1420	1270
2x-2y	25	5570	0.7	761	680	6050	0.7	896	806	5430	0.7	726	644	5850	0.7	849	764
	40	4630	0.9	253	226	4940	0.9	298	268	4480	0.9	242	214	4750	0.9	283	254
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2060	1630	10.80	9.60	2060	1630	10.80	9.60	1950	1540	10.80	9.60	1950	1540	10.80	9.60
1.04 %	0	6450	0.0	2610	2300	7070	0.0	3010	2670	6320	0.0	2500	2190	6870	0.0	2870	2550
Ar(in²)	11	6300	0.2	2350	2070	6890	0.2	2710	2400	6170	0.2	2250	1980	6690	0.2	2580	2290
=12.00	13	6240	0.3	2050	1810	6820	0.3	2370	2100	6110	0.3	1970	1730	6620	0.3	2260	2010
	17	6100	0.4	1760	1550	6650	0.4	2030	1800	5960	0.4	1690	1480	6450	0.4	1930	1720
12-# 9	21	5920	0.5	1470	1290	6430	0.5	1690	1500	5780	0.5	1410	1230	6240	0.5	1610	1430
4x-4y	25	5710	0.7	879	776	6190	0.7	1020	900	5570	0.7	844	740	5990	0.7	967	859
	40	4720	0.9	293	258	5020	0.9	338	300	4570	0.9	281	246	4830	0.9	322	286
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2060	1630	10.80	9.60	2060	1630	10.80	9.60	1950	1540	10.80	9.60	1950	1540	10.80	9.60
2.08 %	0	6830	0.0	3170	2900	7450	0.0	3570	3240	6700	0.0	3070	2810	7250	0.0	3430	3120
Ar(in²)	11	6660	0.2	2860	2610	7250	0.2	3210	2920	6530	0.2	2760	2530	7050	0.2	3080	2810
=24.00	13	6600	0.3	2500	2280	7170	0.3	2810	2550	6460	0.3	2420	2210	6970	0.3	2700	2460
	17	6430	0.4	2140	1960	6980	0.4	2410	2190	6290	0.4	2070	1900	6780	0.4	2310	2110
24-# 9	21	6230	0.5	1790	1630	6740	0.5	2010	1820	6090	0.5	1730	1580	6540	0.5	1930	1760
6x-8y	25	6000	0.7	1070	977	6470	0.7	1200	1090	5850	0.7	1040	948	6270	0.7	1160	1050
	40	4900	0.9	357	325	5190	0.9	401	364	4740	0.9	345	316	4990	0.9	385	351
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2050	1620	10.80	9.60	2050	1620	10.80	9.60	1940	1530	10.80	9.60	1940	1530	10.80	9.60
3.13 %	0	7210	0.0	4070	3320	7830	0.0	4460	3600	7080	0.0	3970	3240	7630	0.0	4320	3500
Ar(in²)	11	7020	0.2	3660	2990	7610	0.2	4010	3240	6880	0.2	3570	2920	7410	0.2	3890	3150
=36.00	13	6950	0.3	3200	2610	7520	0.3	3510	2840	6810	0.3	3120	2550	7320	0.3	3400	2760
	17	6770	0.4	2750	2240	7310	0.4	3010	2430	6620	0.4	2680	2190	7110	0.4	2920	2360
16-#14	21	6540	0.5	2290	1870	7050	0.5	2510	2030	6400	0.5	2230	1820	6850	0.5	2430	1970
6x-4y	25	6280	0.7	1370	1120	6740	0.7	1510	1220	6130	0.7	1340	1090	6540	0.7	1460	1180
	40	5070	0.9	457	373	5340	0.9	501	405	4910	0.9	446	364	5140	0.9	486	393
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2040	1610	10.80	9.60	2040	1610	10.80	9.60	1930	1520	10.80	9.60	1930	1520	10.80	9.60
3.91 %	0	7500	0.0	4360	3830	8110	0.0	4740	4120	7360	0.0	4260	3760	7920	0.0	4600	4010
Ar(in²)	11	7290	0.2	3930	3450	7870	0.2	4270	3710	7150	0.2	3840	3390	7670	0.2	4140	3610
=45.00	13	7210	0.3	3440	3020	7780	0.3	3740	3250	7070	0.3	3360	2960	7580	0.3	3630	3160
	17	7020	0.4	2950	2590	7550	0.4	3200	2780	6870	0.4	2880	2540	7350	0.4	3110	2710
20-#14	21	6770	0.5	2450	2160	7270	0.5	2670	2320	6630	0.5	2400	2120	7070	0.5	2590	2260
6x-6y	25	6490	0.7	1470	1290	6950	0.7	1600	1390	6340	0.7	1440	1270	6740	0.7	1550	1350
	40	5190	0.9	490	431	5450	0.9	533	463	5020	0.9	479	423	5250	0.9	518	451
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2030	1610	10.80	9.60	2030	1610	10.80	9.60	1920	1520	10.80	9.60	1920	1520	10.80	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi_c = 0.85$ f'c : 8.0 ksi NW
$\phi_b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 36

Designation		W 12 x336								W 12 x305							
Fy (ksi)		36				50				36				50			
Reinf.	KL	$\phi_c P_n$	$P_u/(\phi_c P_n)$	Mux	Muy	$\phi_c P_n$	$P_u/(\phi_c P_n)$	Mux	Muy	$\phi_c P_n$	$P_u/(\phi_c P_n)$	Mux	Muy	$\phi_c P_n$	$P_u/(\phi_c P_n)$	Mux	Muy
.54 %	0	7520	0.0	3230	2730	8690	0.0	3950	3160	7270	0.0	3030	2610	8340	0.0	3680	3010
Ar(in^2)	11	7380	0.2	2900	2450	8510	0.2	3560	2840	7140	0.2	2730	2340	8160	0.2	3320	2710
= 6.24	13	7330	0.3	2540	2150	8440	0.3	3110	2490	7080	0.3	2390	2050	8090	0.3	2900	2370
	17	7200	0.4	2180	1840	8270	0.4	2670	2130	6950	0.4	2040	1760	7920	0.4	2490	2030
4-#11	21	7040	0.5	1810	1530	8050	0.5	2220	1780	6790	0.5	1700	1470	7710	0.5	2070	1700
2x-2y	25	6840	0.7	1090	920	7800	0.7	1330	1070	6600	0.7	1020	879	7460	0.7	1240	1020
	40	5910	0.9	362	306	6580	0.9	444	355	5670	0.9	340	293	6270	0.9	414	339
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		3120	2460	10.80	9.60	3120	2460	10.80	9.60	2910	2300	10.80	9.60	2910	2300	10.80	9.60
1.04 %	0	7700	0.0	3580	3000	8880	0.0	4300	3430	7460	0.0	3380	2880	8520	0.0	4030	3290
Ar(in^2)	11	7560	0.2	3220	2700	8690	0.2	3870	3090	7310	0.2	3040	2600	8340	0.2	3630	2960
=12.00	13	7500	0.3	2820	2370	8610	0.3	3390	2700	7260	0.3	2660	2270	8260	0.3	3180	2590
	17	7360	0.4	2410	2030	8430	0.4	2900	2320	7120	0.4	2280	1950	8080	0.4	2720	2220
12-# 9	21	7190	0.5	2010	1690	8210	0.5	2420	1930	6950	0.5	1900	1620	7860	0.5	2270	1850
4x-4y	25	6990	0.7	1210	1010	7940	0.7	1450	1160	6750	0.7	1140	973	7600	0.7	1360	1110
	40	6020	0.9	402	338	6680	0.9	484	386	5770	0.9	380	324	6360	0.9	453	370
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		3110	2460	10.80	9.60	3110	2460	10.80	9.60	2910	2300	10.80	9.60	2910	2300	10.80	9.60
2.08 %	0	8080	0.0	4130	3580	9250	0.0	4840	4000	7840	0.0	3930	3460	8900	0.0	4580	3860
Ar(in^2)	11	7920	0.2	3710	3220	9050	0.2	4360	3600	7680	0.2	3540	3110	8700	0.2	4120	3470
=24.00	13	7860	0.3	3250	2820	8970	0.3	3820	3150	7620	0.3	3100	2720	8620	0.3	3600	3040
	17	7710	0.4	2790	2410	8770	0.4	3270	2700	7460	0.4	2650	2330	8420	0.4	3090	2610
24-# 9	21	7520	0.5	2320	2010	8530	0.5	2730	2250	7270	0.5	2210	1940	8180	0.5	2570	2170
6x-8y	25	7300	0.7	1390	1210	8240	0.7	1640	1350	7050	0.7	1330	1170	7900	0.7	1540	1300
	40	6230	0.9	464	402	6870	0.9	545	450	5980	0.9	442	388	6550	0.9	514	434
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		3100	2450	10.80	9.60	3100	2450	10.80	9.60	2900	2290	10.80	9.60	2900	2290	10.80	9.60
3.13 %	0	8460	0.0	5030	3930	9630	0.0	5750	4360	8210	0.0	4830	3810	9280	0.0	5480	4220
Ar(in^2)	11	8290	0.2	4520	3540	9410	0.2	5180	3920	8040	0.2	4350	3430	9060	0.2	4930	3790
=36.00	13	8220	0.3	3960	3100	9320	0.3	4530	3430	7970	0.3	3800	3000	8970	0.3	4320	3320
	17	8050	0.4	3390	2650	9110	0.4	3880	2940	7800	0.4	3260	2570	8760	0.4	3700	2850
16-#14	21	7850	0.5	2830	2210	8840	0.5	3230	2450	7600	0.5	2720	2150	8500	0.5	3080	2370
6x-4y	25	7600	0.7	1700	1330	8530	0.7	1940	1470	7350	0.7	1630	1290	8190	0.7	1850	1420
	40	6440	0.9	565	442	7060	0.9	646	490	6190	0.9	543	429	6740	0.9	616	474
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		3090	2440	10.80	9.60	3090	2440	10.80	9.60	2890	2280	10.80	9.60	2890	2280	10.80	9.60
3.91 %	0	8740	0.0	5300	4440	9920	0.0	6020	4870	8500	0.0	5100	4330	9570	0.0	5750	4730
Ar(in^2)	11	8560	0.2	4770	4000	9680	0.2	5420	4380	8310	0.2	4590	3890	9330	0.2	5180	4250
=45.00	13	8490	0.3	4170	3500	9590	0.3	4740	3830	8240	0.3	4020	3410	9240	0.3	4530	3720
	17	8310	0.4	3580	3000	9360	0.4	4060	3280	8060	0.4	3440	2920	9010	0.4	3880	3190
20-#14	21	8090	0.5	2980	2500	9080	0.5	3390	2740	7840	0.5	2870	2430	8730	0.5	3240	2660
6x-6y	25	7830	0.7	1790	1500	8750	0.7	2030	1640	7580	0.7	1720	1460	8400	0.7	1940	1590
	40	6590	0.9	595	500	7200	0.9	677	547	6330	0.9	573	486	6870	0.9	647	531
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		3090	2440	10.80	9.60	3090	2440	10.80	9.60	2880	2280	10.80	9.60	2880	2280	10.80	9.60

Notes : 1. Cex = $Pex(KxLx)^2/10000.$ (kip-ft^2), Cey = $Pey(KyLy)^2/10000.$ (kip-ft^2), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for $\phi_c P_n$, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = $\phi_b M_{nx}$ and Muy = $\phi_b M_{ny}$ when $P_u/(\phi_c P_n) = 0.0$

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 36

Designation		W 12 x279								W 12 x252							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	7070	0.0	2870	2500	8040	0.0	3460	2890	6860	0.0	2700	2390	7740	0.0	3240	2760
Ar(in²)	11	6930	0.2	2580	2250	7870	0.2	3110	2600	6730	0.2	2430	2150	7570	0.2	2910	2480
= 6.24	13	6880	0.3	2260	1970	7800	0.3	2720	2280	6670	0.3	2130	1880	7500	0.3	2550	2170
	17	6750	0.4	1930	1690	7630	0.4	2340	1950	6540	0.4	1830	1610	7330	0.4	2190	1860
4-#11	21	6590	0.5	1610	1410	7420	0.5	1950	1630	6380	0.5	1520	1340	7130	0.5	1820	1550
2x-2y	25	6390	0.7	967	843	7170	0.7	1170	975	6180	0.7	912	805	6880	0.7	1090	931
	40	5470	0.9	322	281	6000	0.9	389	325	5260	0.9	304	268	5730	0.9	364	310
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2740	2160	10.80	9.60	2740	2160	10.80	9.60	2560	2030	10.80	9.60	2560	2030	10.80	9.60
1.04 %	0	7250	0.0	3220	2780	8230	0.0	3810	3170	7040	0.0	3050	2670	7930	0.0	3590	3040
Ar(in²)	11	7110	0.2	2890	2500	8040	0.2	3430	2850	6900	0.2	2750	2400	7740	0.2	3230	2730
=12.00	13	7050	0.3	2530	2190	7970	0.3	3000	2500	6840	0.3	2400	2100	7670	0.3	2830	2390
	17	6910	0.4	2170	1880	7790	0.4	2570	2140	6700	0.4	2060	1800	7500	0.4	2420	2050
12-# 9	21	6740	0.5	1810	1560	7570	0.5	2140	1780	6530	0.5	1720	1500	7280	0.5	2020	1710
4x-4y	25	6540	0.7	1090	937	7320	0.7	1290	1070	6330	0.7	1030	899	7030	0.7	1210	1030
	40	5570	0.9	361	312	6090	0.9	428	356	5350	0.9	343	299	5820	0.9	403	341
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2730	2160	10.80	9.60	2730	2160	10.80	9.60	2560	2020	10.80	9.60	2560	2020	10.80	9.60
2.08 %	0	7630	0.0	3770	3350	8610	0.0	4350	3740	7420	0.0	3610	3240	8310	0.0	4130	3610
Ar(in²)	11	7470	0.2	3390	3020	8400	0.2	3920	3360	7260	0.2	3250	2920	8100	0.2	3720	3250
=24.00	13	7410	0.3	2970	2640	8320	0.3	3430	2940	7200	0.3	2840	2550	8030	0.3	3260	2840
	17	7260	0.4	2540	2260	8130	0.4	2940	2520	7040	0.4	2440	2190	7830	0.4	2790	2440
24-# 9	21	7070	0.5	2120	1890	7890	0.5	2450	2100	6850	0.5	2030	1820	7590	0.5	2330	2030
6x-8y	25	6840	0.7	1270	1130	7610	0.7	1470	1260	6630	0.7	1220	1090	7320	0.7	1400	1220
	40	5770	0.9	424	377	6280	0.9	489	420	5550	0.9	406	364	6000	0.9	465	405
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2720	2150	10.80	9.60	2720	2150	10.80	9.60	2550	2010	10.80	9.60	2550	2010	10.80	9.60
3.13 %	0	8010	0.0	4670	3710	8990	0.0	5260	4090	7800	0.0	4510	3600	8690	0.0	5040	3970
Ar(in²)	11	7830	0.2	4200	3340	8760	0.2	4730	3680	7620	0.2	4060	3240	8460	0.2	4530	3570
=36.00	13	7770	0.3	3680	2920	8680	0.3	4140	3220	7560	0.3	3550	2830	8380	0.3	3970	3120
	17	7600	0.4	3150	2500	8470	0.4	3550	2760	7380	0.4	3040	2430	8170	0.4	3400	2680
16-#14	21	7390	0.5	2630	2090	8200	0.5	2960	2300	7170	0.5	2540	2020	7910	0.5	2830	2230
6x-4y	25	7140	0.7	1580	1250	7900	0.7	1770	1380	6920	0.7	1520	1210	7600	0.7	1700	1340
	40	5970	0.9	525	417	6460	0.9	591	460	5740	0.9	507	404	6180	0.9	566	446
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2720	2150	10.80	9.60	2720	2150	10.80	9.60	2540	2010	10.80	9.60	2540	2010	10.80	9.60
3.91 %	0	8300	0.0	4940	4220	9270	0.0	5530	4610	8090	0.0	4780	4110	8970	0.0	5310	4480
Ar(in²)	11	8110	0.2	4450	3800	9030	0.2	4980	4140	7900	0.2	4300	3700	8730	0.2	4780	4030
=45.00	13	8030	0.3	3890	3330	8940	0.3	4350	3630	7820	0.3	3760	3240	8640	0.3	4180	3530
	17	7850	0.4	3330	2850	8720	0.4	3730	3110	7640	0.4	3230	2780	8420	0.4	3580	3020
20-#14	21	7630	0.5	2780	2380	8440	0.5	3110	2590	7410	0.5	2690	2310	8140	0.5	2990	2520
6x-6y	25	7360	0.7	1670	1430	8110	0.7	1870	1550	7140	0.7	1610	1390	7810	0.7	1790	1510
	40	6110	0.9	555	475	6590	0.9	622	518	5880	0.9	537	462	6300	0.9	597	503
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2710	2140	10.80	9.60	2710	2140	10.80	9.60	2530	2000	10.80	9.60	2530	2000	10.80	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 8.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) — Column Size(b x h): 32 x 36

Designation		W 12 x230								W 12 x210							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	6690	0.0	2580	2290	7500	0.0	3060	2650	6540	0.0	2460	2200	7270	0.0	2900	2540
Ar(in²)	11	6550	0.2	2320	2060	7330	0.2	2760	2390	6400	0.2	2210	1980	7100	0.2	2610	2290
= 6.24	13	6500	0.3	2030	1800	7260	0.3	2410	2090	6340	0.3	1940	1730	7030	0.3	2290	2000
	17	6370	0.4	1740	1550	7090	0.4	2070	1790	6210	0.4	1660	1480	6870	0.4	1960	1720
4-#11	21	6200	0.5	1450	1290	6890	0.5	1720	1490	6040	0.5	1380	1230	6660	0.5	1630	1430
2x-2y	25	6010	0.7	869	772	6650	0.7	1030	894	5850	0.7	829	740	6430	0.7	979	858
	40	5080	0.9	289	257	5510	0.9	344	298	4920	0.9	276	246	5300	0.9	326	286
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2420	1910	10.80	9.60	2420	1910	10.80	9.60	2290	1810	10.80	9.60	2290	1810	10.80	9.60
1.04 %	0	6880	0.0	2930	2570	7680	0.0	3410	2930	6720	0.0	2810	2480	7450	0.0	3250	2820
Ar(in²)	11	6730	0.2	2630	2310	7500	0.2	3070	2640	6570	0.2	2530	2230	7270	0.2	2930	2540
=12.00	13	6670	0.3	2300	2020	7430	0.3	2690	2310	6510	0.3	2210	1950	7200	0.3	2560	2220
	17	6530	0.4	1980	1730	7250	0.4	2300	1980	6370	0.4	1900	1670	7030	0.4	2200	1910
12-# 9	21	6360	0.5	1650	1450	7040	0.5	1920	1650	6200	0.5	1580	1390	6810	0.5	1830	1590
4x-4y	25	6150	0.7	987	867	6790	0.7	1150	988	5990	0.7	947	835	6560	0.7	1100	952
	40	5180	0.9	329	289	5590	0.9	384	329	5010	0.9	315	278	5380	0.9	366	317
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2420	1910	10.80	9.60	2420	1910	10.80	9.60	2280	1800	10.80	9.60	2280	1800	10.80	9.60
2.08 %	0	7250	0.0	3480	3140	8060	0.0	3960	3500	7100	0.0	3370	3050	7830	0.0	3800	3390
Ar(in²)	11	7090	0.2	3130	2830	7860	0.2	3560	3150	6930	0.2	3030	2750	7630	0.2	3420	3050
=24.00	13	7030	0.3	2740	2480	7780	0.3	3120	2760	6870	0.3	2650	2400	7550	0.3	2990	2670
	17	6870	0.4	2350	2120	7590	0.4	2670	2360	6710	0.4	2270	2060	7360	0.4	2560	2290
24-# 9	21	6680	0.5	1960	1770	7350	0.5	2230	1970	6510	0.5	1890	1720	7130	0.5	2140	1910
6x-8y	25	6450	0.7	1180	1060	7070	0.7	1340	1180	6290	0.7	1140	1030	6850	0.7	1280	1150
	40	5370	0.9	391	353	5770	0.9	445	393	5200	0.9	378	343	5560	0.9	427	381
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2410	1900	10.80	9.60	2410	1900	10.80	9.60	2270	1800	10.80	9.60	2270	1800	10.80	9.60
3.13 %	0	7630	0.0	4380	3500	8440	0.0	4860	3860	7480	0.0	4260	3410	8210	0.0	4700	3750
Ar(in²)	11	7450	0.2	3940	3150	8220	0.2	4380	3470	7290	0.2	3840	3070	7990	0.2	4230	3380
=36.00	13	7380	0.3	3450	2760	8130	0.3	3830	3040	7220	0.3	3360	2690	7910	0.3	3700	2960
	17	7210	0.4	2960	2360	7920	0.4	3280	2600	7050	0.4	2880	2300	7690	0.4	3170	2530
16-#14	21	6990	0.5	2460	1970	7660	0.5	2740	2170	6830	0.5	2400	1920	7430	0.5	2650	2110
6x-4y	25	6740	0.7	1480	1180	7360	0.7	1640	1300	6580	0.7	1440	1150	7130	0.7	1590	1270
	40	5560	0.9	492	394	5940	0.9	547	433	5380	0.9	479	383	5720	0.9	529	422
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2400	1890	10.80	9.60	2400	1890	10.80	9.60	2270	1790	10.80	9.60	2270	1790	10.80	9.60
3.91 %	0	7920	0.0	4650	4020	8720	0.0	5130	4370	7760	0.0	4530	3930	8500	0.0	4970	4270
Ar(in²)	11	7720	0.2	4180	3620	8490	0.2	4620	3930	7560	0.2	4080	3530	8260	0.2	4480	3840
=45.00	13	7650	0.3	3660	3170	8400	0.3	4040	3440	7490	0.3	3570	3090	8170	0.3	3920	3360
	17	7460	0.4	3140	2710	8170	0.4	3470	2950	7300	0.4	3060	2650	7940	0.4	3360	2880
20-#14	21	7230	0.5	2620	2260	7890	0.5	2890	2460	7060	0.5	2550	2210	7660	0.5	2800	2400
6x-6y	25	6960	0.7	1570	1360	7570	0.7	1730	1470	6790	0.7	1530	1330	7340	0.7	1680	1440
	40	5690	0.9	523	452	6060	0.9	577	491	5510	0.9	509	441	5840	0.9	559	479
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2390	1890	10.80	9.60	2390	1890	10.80	9.60	2260	1780	10.80	9.60	2260	1780	10.80	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD $\phi c = 0.85$ f'c : 8.0 ksi NW

$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 36

Designation		W 12 x190								W 12 x170							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.54 %	0	6380	0.0	2340	2090	7040	0.0	2740	2430	6220	0.0	2230	1990	6820	0.0	2590	2310
Ar(in²)	11	6240	0.2	2110	1880	6870	0.2	2470	2190	6080	0.2	2010	1790	6650	0.2	2330	2080
= 6.24	13	6180	0.3	1840	1650	6800	0.3	2160	1910	6030	0.3	1760	1570	6580	0.3	2040	1820
	17	6050	0.4	1580	1410	6640	0.4	1850	1640	5890	0.4	1500	1340	6420	0.4	1750	1560
4-#11	21	5880	0.5	1320	1180	6440	0.5	1540	1370	5720	0.5	1250	1120	6220	0.5	1460	1300
2x-2y	25	5680	0.7	790	706	6200	0.7	926	819	5520	0.7	752	670	5980	0.7	874	780
	40	4750	0.9	263	235	5080	0.9	308	273	4580	0.9	250	223	4870	0.9	291	260
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2150	1700	10.80	9.60	2150	1700	10.80	9.60	2020	1600	10.80	9.60	2020	1600	10.80	9.60
1.04 %	0	6560	0.0	2690	2380	7220	0.0	3100	2710	6410	0.0	2580	2270	7000	0.0	2940	2590
Ar(in²)	11	6410	0.2	2420	2140	7040	0.2	2790	2440	6250	0.2	2320	2040	6820	0.2	2650	2330
=12.00	13	6350	0.3	2120	1870	6970	0.3	2440	2130	6200	0.3	2030	1790	6750	0.3	2320	2040
	17	6210	0.4	1820	1600	6800	0.4	2090	1830	6050	0.4	1740	1530	6580	0.4	1990	1750
12-# 9	21	6030	0.5	1510	1340	6590	0.5	1740	1520	5870	0.5	1450	1280	6360	0.5	1650	1460
4x-4y	25	5820	0.7	908	801	6340	0.7	1040	914	5660	0.7	870	765	6120	0.7	992	874
	40	4840	0.9	302	267	5170	0.9	348	304	4670	0.9	290	255	4960	0.9	330	291
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2150	1700	10.80	9.60	2150	1700	10.80	9.60	2020	1600	10.80	9.60	2020	1600	10.80	9.60
2.08 %	0	6940	0.0	3250	2950	7600	0.0	3640	3280	6790	0.0	3140	2850	7380	0.0	3490	3170
Ar(in²)	11	6770	0.2	2930	2660	7400	0.2	3280	2950	6610	0.2	2830	2560	7180	0.2	3140	2850
=24.00	13	6710	0.3	2560	2320	7320	0.3	2870	2580	6550	0.3	2470	2240	7100	0.3	2750	2490
	17	6550	0.4	2190	1990	7130	0.4	2460	2220	6380	0.4	2120	1920	6910	0.4	2360	2140
24-# 9	21	6350	0.5	1830	1660	6900	0.5	2050	1850	6180	0.5	1770	1600	6670	0.5	1960	1780
6x-8y	25	6120	0.7	1100	995	6620	0.7	1230	1110	5950	0.7	1060	960	6400	0.7	1180	1070
	40	5020	0.9	365	331	5340	0.9	409	369	4850	0.9	353	320	5120	0.9	392	356
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2140	1690	10.80	9.60	2140	1690	10.80	9.60	2010	1590	10.80	9.60	2010	1590	10.80	9.60
3.13 %	0	7320	0.0	4150	3330	7980	0.0	4550	3640	7160	0.0	4030	3250	7760	0.0	4390	3520
Ar(in²)	11	7130	0.2	3730	2990	7760	0.2	4090	3280	6970	0.2	3630	2930	7540	0.2	3950	3170
=36.00	13	7060	0.3	3260	2620	7670	0.3	3580	2870	6900	0.3	3180	2560	7450	0.3	3460	2780
	17	6880	0.4	2800	2250	7460	0.4	3070	2460	6720	0.4	2720	2190	7240	0.4	2960	2380
16-#14	21	6660	0.5	2330	1870	7200	0.5	2560	2050	6490	0.5	2270	1830	6980	0.5	2470	1980
6x-4y	25	6400	0.7	1400	1120	6900	0.7	1530	1230	6230	0.7	1360	1100	6670	0.7	1480	1190
	40	5200	0.9	466	374	5490	0.9	511	409	5010	0.9	453	365	5270	0.9	494	396
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2130	1680	10.80	9.60	2130	1680	10.80	9.60	2000	1580	10.80	9.60	2000	1580	10.80	9.60
3.91 %	0	7600	0.0	4420	3840	8270	0.0	4820	4160	7450	0.0	4300	3760	8040	0.0	4660	4040
Ar(in²)	11	7400	0.2	3970	3460	8030	0.2	4330	3740	7240	0.2	3870	3390	7800	0.2	4200	3640
=45.00	13	7320	0.3	3480	3020	7930	0.3	3790	3270	7160	0.3	3390	2960	7710	0.3	3670	3180
	17	7130	0.4	2980	2590	7710	0.4	3250	2800	6960	0.4	2900	2540	7480	0.4	3150	2730
20-#14	21	6890	0.5	2480	2160	7430	0.5	2710	2340	6720	0.5	2420	2120	7200	0.5	2620	2270
6x-6y	25	6610	0.7	1490	1300	7100	0.7	1630	1400	6440	0.7	1450	1270	6870	0.7	1570	1360
	40	5320	0.9	496	432	5610	0.9	541	467	5130	0.9	484	423	5380	0.9	524	454
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2120	1680	10.80	9.60	2120	1680	10.80	9.60	1990	1580	10.80	9.60	1990	1580	10.80	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 32 x 32

Designation		W 14 x426								W 14 x398							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.50 %	0	7650	0.0	3490	2990	9140	0.0	4500	3540	7440	0.0	3300	2880	8830	0.0	4230	3410
Ar(in²)	11	7530	0.2	3140	2690	8970	0.2	4050	3190	7320	0.2	2970	2600	8660	0.2	3800	3070
= 5.08	13	7480	0.3	2750	2360	8900	0.3	3540	2790	7270	0.3	2600	2270	8600	0.3	3330	2690
	17	7370	0.4	2360	2020	8730	0.4	3040	2390	7160	0.4	2230	1950	8430	0.4	2850	2300
4-#10	21	7220	0.5	1970	1680	8530	0.5	2530	1990	7010	0.5	1850	1620	8230	0.5	2380	1920
2x-2y	25	7050	0.7	1180	1010	8280	0.7	1520	1200	6840	0.7	1110	973	7990	0.7	1430	1150
	40	6190	0.9	393	336	7100	0.9	506	398	5990	0.9	370	324	6830	0.9	475	383
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2850	2850	9.60	9.60	2850	2850	9.60	9.60	2710	2710	9.60	9.60	2710	2710	9.60	9.60
.99 %	0	7810	0.0	3790	3190	9300	0.0	4800	3740	7600	0.0	3600	3080	8990	0.0	4530	3610
Ar(in²)	11	7690	0.2	3410	2870	9120	0.2	4320	3370	7480	0.2	3240	2780	8820	0.2	4070	3250
=10.16	13	7640	0.3	2990	2510	9050	0.3	3780	2950	7430	0.3	2830	2430	8750	0.3	3570	2840
	17	7510	0.4	2560	2150	8880	0.4	3240	2520	7300	0.4	2430	2080	8580	0.4	3060	2440
8-#10	21	7360	0.5	2130	1790	8660	0.5	2700	2100	7150	0.5	2020	1740	8370	0.5	2550	2030
4x-2y	25	7180	0.7	1280	1080	8410	0.7	1620	1260	6970	0.7	1210	1040	8120	0.7	1530	1220
	40	6290	0.9	426	358	7190	0.9	539	420	6090	0.9	404	347	6920	0.9	509	405
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2840	2840	9.60	9.60	2840	2840	9.60	9.60	2700	2700	9.60	9.60	2700	2700	9.60	9.60
1.98 %	0	8140	0.0	4320	3590	9620	0.0	5330	4140	7920	0.0	4130	3490	9320	0.0	5060	4010
Ar(in²)	11	8000	0.2	3890	3230	9430	0.2	4790	3730	7790	0.2	3720	3140	9130	0.2	4550	3610
=20.32	13	7940	0.3	3410	2830	9360	0.3	4200	3260	7730	0.3	3250	2740	9050	0.3	3980	3160
	17	7810	0.4	2920	2420	9170	0.4	3600	2790	7600	0.4	2790	2350	8870	0.4	3410	2710
16-#10	21	7640	0.5	2430	2020	8940	0.5	3000	2330	7430	0.5	2320	1960	8640	0.5	2840	2250
6x-4y	25	7450	0.7	1460	1210	8670	0.7	1800	1400	7240	0.7	1390	1180	8380	0.7	1710	1350
	40	6490	0.9	486	403	7370	0.9	599	465	6290	0.9	464	392	7100	0.9	568	450
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2840	2840	9.60	9.60	2840	2840	9.60	9.60	2700	2700	9.60	9.60	2700	2700	9.60	9.60
3.05 %	0	8480	0.0	4740	4210	9970	0.0	5740	4750	8270	0.0	4550	4100	9660	0.0	5470	4620
Ar(in²)	11	8330	0.2	4270	3790	9760	0.2	5160	4280	8120	0.2	4100	3690	9460	0.2	4920	4160
=31.20	13	8270	0.3	3740	3310	9680	0.3	4520	3740	8060	0.3	3580	3230	9380	0.3	4310	3640
	17	8130	0.4	3200	2840	9480	0.4	3870	3210	7910	0.4	3070	2770	9180	0.4	3690	3120
20-#11	21	7950	0.5	2670	2370	9230	0.5	3230	2670	7730	0.5	2560	2310	8930	0.5	3080	2600
6x-6y	25	7730	0.7	1600	1420	8940	0.7	1940	1600	7520	0.7	1540	1380	8650	0.7	1850	1560
	40	6700	0.9	533	473	7550	0.9	645	534	6490	0.9	511	461	7280	0.9	615	519
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2830	2830	9.60	9.60	2830	2830	9.60	9.60	2690	2690	9.60	9.60	2690	2690	9.60	9.60
4.39 %	0	8920	0.0	5390	4760	10400	0.0	6380	5310	8700	0.0	5200	4660	10100	0.0	6120	5180
Ar(in²)	11	8750	0.2	4860	4290	10200	0.2	5740	4780	8540	0.2	4680	4190	9870	0.2	5510	4660
=45.00	13	8680	0.3	4250	3750	10100	0.3	5020	4180	8470	0.3	4090	3670	9780	0.3	4820	4080
	17	8520	0.4	3640	3220	9870	0.4	4300	3580	8310	0.4	3510	3150	9570	0.4	4130	3490
20-#14	21	8320	0.5	3030	2680	9600	0.5	3590	2980	8110	0.5	2920	2620	9300	0.5	3440	2910
6x-6y	25	8090	0.7	1820	1610	9290	0.7	2150	1790	7880	0.7	1750	1570	8990	0.7	2060	1750
	40	6950	0.9	606	535	7780	0.9	717	596	6740	0.9	584	524	7500	0.9	688	582
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2820	2820	9.60	9.60	2820	2820	9.60	9.60	2680	2680	9.60	9.60	2680	2680	9.60	9.60

Notes : 1. Cex = $Pex(KxLx)^2/10000$. (kip-ft²), Cey = $Pey(KyLy)^2/10000$. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = $\phi bMnx$ and Muy = $\phi bMny$ when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 32

Designation		W 14 x370								W 14 x342							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.50 %	0	7230	0.0	3110	2780	8530	0.0	3960	3280	7020	0.0	2920	2660	8220	0.0	3700	3140
Ar(in²)	11	7110	0.2	2800	2500	8360	0.2	3570	2950	6900	0.2	2630	2400	8050	0.2	3330	2830
= 5.08	13	7060	0.3	2450	2190	8290	0.3	3120	2580	6850	0.3	2300	2100	7990	0.3	2920	2470
	17	6940	0.4	2100	1870	8130	0.4	2680	2210	6730	0.4	1970	1800	7830	0.4	2500	2120
4-#10	21	6800	0.5	1750	1560	7930	0.5	2230	1840	6590	0.5	1640	1500	7640	0.5	2080	1770
2x-2y	25	6630	0.7	1050	937	7700	0.7	1340	1110	6420	0.7	984	899	7400	0.7	1250	1060
	40	5790	0.9	349	312	6560	0.9	446	368	5590	0.9	328	299	6290	0.9	416	353
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2560	2560	9.60	9.60	2560	2560	9.60	9.60	2420	2420	9.60	9.60	2420	2420	9.60	9.60
.99 %	0	7390	0.0	3410	2980	8690	0.0	4260	3480	7180	0.0	3220	2860	8380	0.0	4000	3340
Ar(in²)	11	7260	0.2	3070	2680	8510	0.2	3840	3130	7050	0.2	2900	2580	8210	0.2	3600	3010
=10.16	13	7210	0.3	2680	2340	8450	0.3	3360	2740	7000	0.3	2530	2260	8140	0.3	3150	2630
	17	7090	0.4	2300	2010	8280	0.4	2880	2350	6880	0.4	2170	1930	7980	0.4	2700	2250
8-#10	21	6940	0.5	1920	1670	8070	0.5	2400	1950	6730	0.5	1810	1610	7770	0.5	2250	1880
4x-2y	25	6760	0.7	1150	1000	7830	0.7	1440	1170	6550	0.7	1090	966	7530	0.7	1350	1130
	40	5890	0.9	383	334	6650	0.9	479	390	5680	0.9	361	322	6380	0.9	450	375
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2560	2560	9.60	9.60	2560	2560	9.60	9.60	2420	2420	9.60	9.60	2420	2420	9.60	9.60
1.98 %	0	7710	0.0	3940	3380	9010	0.0	4800	3870	7500	0.0	3750	3270	8700	0.0	4540	3740
Ar(in²)	11	7570	0.2	3540	3040	8820	0.2	4320	3490	7360	0.2	3370	2940	8520	0.2	4080	3370
=20.32	13	7520	0.3	3100	2660	8750	0.3	3780	3050	7310	0.3	2950	2570	8440	0.3	3570	2940
	17	7390	0.4	2660	2280	8570	0.4	3240	2620	7170	0.4	2530	2200	8270	0.4	3060	2520
16-#10	21	7220	0.5	2220	1900	8340	0.5	2700	2180	7010	0.5	2110	1840	8050	0.5	2550	2100
6x-4y	25	7030	0.7	1330	1140	8080	0.7	1620	1310	6820	0.7	1270	1100	7790	0.7	1530	1260
	40	6080	0.9	443	379	6820	0.9	539	435	5870	0.9	421	367	6550	0.9	510	420
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2550	2550	9.60	9.60	2550	2550	9.60	9.60	2410	2410	9.60	9.60	2410	2410	9.60	9.60
3.05 %	0	8060	0.0	4370	4000	9350	0.0	5210	4490	7840	0.0	4180	3880	9040	0.0	4950	4360
Ar(in²)	11	7900	0.2	3930	3600	9150	0.2	4690	4040	7690	0.2	3760	3500	8840	0.2	4450	3920
=31.20	13	7850	0.3	3440	3150	9070	0.3	4100	3540	7630	0.3	3290	3060	8770	0.3	3900	3430
	17	7700	0.4	2950	2700	8880	0.4	3520	3030	7490	0.4	2820	2620	8570	0.4	3340	2940
20-#11	21	7520	0.5	2460	2250	8640	0.5	2930	2530	7310	0.5	2350	2190	8340	0.5	2780	2450
6x-6y	25	7310	0.7	1470	1350	8350	0.7	1760	1520	7090	0.7	1410	1310	8060	0.7	1670	1470
	40	6280	0.9	491	449	7000	0.9	585	505	6070	0.9	470	437	6730	0.9	556	489
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2550	2550	9.60	9.60	2550	2550	9.60	9.60	2410	2410	9.60	9.60	2410	2410	9.60	9.60
4.39 %	0	8490	0.0	5000	4550	9790	0.0	5870	5050	8280	0.0	4810	4440	9480	0.0	5610	4910
Ar(in²)	11	8320	0.2	4500	4100	9570	0.2	5280	4540	8110	0.2	4330	4000	9260	0.2	5050	4420
=45.00	13	8260	0.3	3940	3590	9480	0.3	4620	3970	8040	0.3	3790	3500	9170	0.3	4410	3870
	17	8100	0.4	3380	3070	9270	0.4	3960	3410	7880	0.4	3250	3000	8960	0.4	3780	3310
20-#14	21	7900	0.5	2810	2560	9000	0.5	3300	2840	7680	0.5	2710	2500	8700	0.5	3150	2760
6x-6y	25	7660	0.7	1690	1540	8690	0.7	1980	1700	7440	0.7	1620	1500	8390	0.7	1890	1660
	40	6520	0.9	562	512	7220	0.9	660	567	6310	0.9	541	499	6940	0.9	630	552
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2540	2540	9.60	9.60	2540	2540	9.60	9.60	2400	2400	9.60	9.60	2400	2400	9.60	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 32 x 32

Designation		W 14 x311							
Fy (ksi)		36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.50 %	0	6760	0.0	2710	2540	7850	0.0	3420	2990
Ar(in^2)	11	6640	0.2	2440	2280	7690	0.2	3080	2690
= 5.08	13	6600	0.3	2140	2000	7630	0.3	2690	2350
	17	6480	0.4	1830	1710	7470	0.4	2310	2020
4-#10	21	6340	0.5	1530	1430	7280	0.5	1920	1680
2x-2y	25	6170	0.7	915	855	7050	0.7	1150	1010
	40	5340	0.9	305	285	5970	0.9	384	336
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2250	2250	9.60	9.60	2250	2250	9.60	9.60
.99 %	0	6920	0.0	3010	2740	8010	0.0	3720	3190
Ar(in^2)	11	6800	0.2	2710	2460	7840	0.2	3350	2870
=10.16	13	6750	0.3	2370	2160	7780	0.3	2930	2510
	17	6630	0.4	2030	1850	7610	0.4	2510	2150
8-#10	21	6480	0.5	1700	1540	7410	0.5	2090	1790
4x-2y	25	6300	0.7	1020	923	7180	0.7	1260	1080
	40	5430	0.9	339	307	6050	0.9	418	358
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2250	2250	9.60	9.60	2250	2250	9.60	9.60
1.98 %	0	7240	0.0	3550	3140	8330	0.0	4250	3590
Ar(in^2)	11	7110	0.2	3190	2820	8150	0.2	3830	3230
=20.32	13	7050	0.3	2790	2470	8080	0.3	3350	2820
	17	6920	0.4	2390	2120	7900	0.4	2870	2420
16-#10	21	6750	0.5	1990	1770	7690	0.5	2390	2020
6x-4y	25	6560	0.7	1200	1060	7430	0.7	1440	1210
	40	5620	0.9	398	353	6220	0.9	478	403
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2240	2240	9.60	9.60	2240	2240	9.60	9.60
3.05 %	0	7590	0.0	3980	3760	8680	0.0	4670	4200
Ar(in^2)	11	7440	0.2	3580	3380	8480	0.2	4200	3780
=31.20	13	7380	0.3	3130	2960	8400	0.3	3680	3310
	17	7230	0.4	2680	2540	8210	0.4	3150	2840
20-#11	21	7050	0.5	2240	2110	7980	0.5	2630	2360
6x-6y	25	6840	0.7	1340	1270	7700	0.7	1580	1420
	40	5810	0.9	447	422	6390	0.9	525	472
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2240	2240	9.60	9.60	2240	2240	9.60	9.60
4.39 %	0	8020	0.0	4610	4320	9110	0.0	5320	4760
Ar(in^2)	11	7850	0.2	4150	3890	8890	0.2	4790	4280
=45.00	13	7790	0.3	3630	3400	8810	0.3	4190	3750
	17	7620	0.4	3110	2920	8600	0.4	3590	3210
20-#14	21	7420	0.5	2590	2430	8340	0.5	2990	2680
6x-6y	25	7180	0.7	1560	1460	8030	0.7	1800	1610
	40	6040	0.9	518	485	6600	0.9	598	535
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2230	2230	9.60	9.60	2230	2230	9.60	9.60

Designation		W 14 x283							
Fy (ksi)		36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.50 %	0	6550	0.0	2530	2420	7540	0.0	3170	2850
Ar(in^2)	11	6430	0.2	2280	2170	7380	0.2	2860	2560
= 5.08	13	6380	0.3	1990	1900	7320	0.3	2500	2240
	17	6260	0.4	1710	1630	7170	0.4	2140	1920
4-#10	21	6120	0.5	1420	1360	6980	0.5	1790	1600
2x-2y	25	5950	0.7	854	815	6750	0.7	1070	960
	40	5130	0.9	284	271	5690	0.9	357	320
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2110	2110	9.60	9.60	2110	2110	9.60	9.60
.99 %	0	6710	0.0	2830	2620	7700	0.0	3470	3040
Ar(in^2)	11	6580	0.2	2550	2360	7530	0.2	3130	2740
=10.16	13	6530	0.3	2230	2060	7470	0.3	2740	2400
	17	6410	0.4	1910	1770	7310	0.4	2340	2060
8-#10	21	6260	0.5	1590	1470	7110	0.5	1950	1710
4x-2y	25	6080	0.7	955	883	6880	0.7	1170	1030
	40	5220	0.9	318	294	5770	0.9	390	342
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2110	2110	9.60	9.60	2110	2110	9.60	9.60
1.98 %	0	7030	0.0	3360	3020	8020	0.0	4010	3450
Ar(in^2)	11	6890	0.2	3030	2720	7840	0.2	3600	3100
=20.32	13	6840	0.3	2650	2380	7770	0.3	3150	2710
	17	6700	0.4	2270	2040	7600	0.4	2700	2330
16-#10	21	6540	0.5	1890	1700	7380	0.5	2250	1940
6x-4y	25	6340	0.7	1140	1020	7130	0.7	1350	1160
	40	5400	0.9	378	339	5940	0.9	450	387
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2100	2100	9.60	9.60	2100	2100	9.60	9.60
3.05 %	0	7370	0.0	3800	3640	8360	0.0	4420	4060
Ar(in^2)	11	7220	0.2	3420	3280	8170	0.2	3980	3660
=31.20	13	7160	0.3	2990	2870	8090	0.3	3480	3200
	17	7010	0.4	2560	2460	7900	0.4	2990	2740
20-#11	21	6830	0.5	2140	2050	7670	0.5	2490	2290
6x-6y	25	6620	0.7	1280	1230	7400	0.7	1490	1370
	40	5590	0.9	427	409	6110	0.9	497	457
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2090	2090	9.60	9.60	2090	2090	9.60	9.60
4.39 %	0	7810	0.0	4430	4200	8800	0.0	5070	4620
Ar(in^2)	11	7640	0.2	3990	3780	8580	0.2	4560	4160
=45.00	13	7570	0.3	3490	3310	8500	0.3	3990	3640
	17	7400	0.4	2990	2840	8290	0.4	3420	3120
20-#14	21	7200	0.5	2490	2360	8030	0.5	2850	2600
6x-6y	25	6960	0.7	1500	1420	7730	0.7	1710	1560
	40	5810	0.9	498	472	6310	0.9	570	519
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2080	2080	9.60	9.60	2080	2080	9.60	9.60

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 32

Designation		W 14 x257								W 14 x233							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	6340	0.0	2370	2300	7240	0.0	2940	2710	6160	0.0	2210	2180	6970	0.0	2740	2570
Ar(in²)	11	6220	0.2	2130	2070	7090	0.2	2650	2440	6030	0.2	1990	1960	6820	0.2	2460	2320
= 5.08	13	6180	0.3	1860	1810	7030	0.3	2320	2130	5990	0.3	1740	1720	6750	0.3	2150	2030
	17	6060	0.4	1600	1550	6870	0.4	1990	1830	5870	0.4	1490	1470	6610	0.4	1850	1740
4-#10	21	5920	0.5	1330	1290	6690	0.5	1660	1520	5730	0.5	1250	1230	6420	0.5	1540	1450
2x-2y	25	5750	0.7	798	775	6470	0.7	993	913	5560	0.7	747	736	6210	0.7	923	868
	40	4920	0.9	266	258	5420	0.9	331	304	4730	0.9	249	245	5180	0.9	307	289
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1970	1970	9.60	9.60	1970	1970	9.60	9.60	1850	1850	9.60	9.60	1850	1850	9.60	9.60
.99 %	0	6500	0.0	2670	2500	7400	0.0	3240	2910	6320	0.0	2510	2380	7130	0.0	3030	2770
Ar(in²)	11	6380	0.2	2400	2250	7240	0.2	2920	2620	6190	0.2	2260	2140	6970	0.2	2730	2500
=10.16	13	6330	0.3	2100	1970	7180	0.3	2560	2290	6140	0.3	1980	1880	6910	0.3	2390	2180
	17	6210	0.4	1800	1690	7020	0.4	2190	1960	6020	0.4	1700	1610	6750	0.4	2050	1870
8-#10	21	6050	0.5	1500	1410	6820	0.5	1830	1640	5860	0.5	1410	1340	6560	0.5	1710	1560
4x-2y	25	5880	0.7	899	843	6600	0.7	1100	981	5680	0.7	848	804	6330	0.7	1020	936
	40	5010	0.9	299	281	5510	0.9	365	327	4820	0.9	282	268	5260	0.9	341	312
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1970	1970	9.60	9.60	1970	1970	9.60	9.60	1840	1840	9.60	9.60	1840	1840	9.60	9.60
1.98 %	0	6830	0.0	3200	2900	7720	0.0	3780	3310	6640	0.0	3050	2790	7450	0.0	3570	3180
Ar(in²)	11	6690	0.2	2880	2610	7550	0.2	3400	2980	6500	0.2	2740	2510	7270	0.2	3210	2860
=20.32	13	6630	0.3	2520	2290	7480	0.3	2970	2610	6440	0.3	2400	2200	7200	0.3	2810	2500
	17	6500	0.4	2160	1960	7300	0.4	2550	2230	6300	0.4	2060	1880	7030	0.4	2410	2140
16-#10	21	6330	0.5	1800	1630	7090	0.5	2120	1860	6140	0.5	1710	1570	6820	0.5	2010	1790
6x-4y	25	6130	0.7	1080	979	6840	0.7	1270	1120	5940	0.7	1030	940	6580	0.7	1200	1070
	40	5190	0.9	359	326	5670	0.9	424	372	4990	0.9	342	313	5410	0.9	401	357
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1960	1960	9.60	9.60	1960	1960	9.60	9.60	1840	1840	9.60	9.60	1840	1840	9.60	9.60
3.05 %	0	7170	0.0	3630	3520	8070	0.0	4190	3930	6980	0.0	3480	3410	7800	0.0	3990	3790
Ar(in²)	11	7010	0.2	3270	3170	7870	0.2	3780	3530	6820	0.2	3130	3070	7600	0.2	3590	3420
=31.20	13	6950	0.3	2860	2780	7800	0.3	3300	3090	6760	0.3	2740	2690	7520	0.3	3140	2990
	17	6810	0.4	2450	2380	7610	0.4	2830	2650	6610	0.4	2350	2300	7340	0.4	2690	2560
20-#11	21	6620	0.5	2040	1980	7380	0.5	2360	2210	6430	0.5	1960	1920	7110	0.5	2250	2130
6x-6y	25	6400	0.7	1230	1190	7110	0.7	1420	1330	6210	0.7	1170	1150	6840	0.7	1350	1280
	40	5370	0.9	408	396	5830	0.9	471	441	5170	0.9	391	383	5570	0.9	449	426
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1960	1960	9.60	9.60	1960	1960	9.60	9.60	1830	1830	9.60	9.60	1830	1830	9.60	9.60
4.39 %	0	7610	0.0	4270	4090	8510	0.0	4830	4480	7420	0.0	4120	3980	8230	0.0	4630	4360
Ar(in²)	11	7430	0.2	3840	3680	8290	0.2	4350	4040	7240	0.2	3710	3580	8010	0.2	4160	3920
=45.00	13	7360	0.3	3360	3220	8200	0.3	3810	3530	7170	0.3	3240	3130	7930	0.3	3640	3430
	17	7190	0.4	2880	2760	7990	0.4	3260	3030	7000	0.4	2780	2680	7720	0.4	3120	2940
20-#14	21	6990	0.5	2400	2300	7740	0.5	2720	2520	6790	0.5	2320	2240	7460	0.5	2600	2450
6x-6y	25	6740	0.7	1440	1380	7440	0.7	1630	1510	6540	0.7	1390	1340	7160	0.7	1560	1470
	40	5590	0.9	480	459	6030	0.9	543	504	5380	0.9	463	447	5770	0.9	520	489
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1950	1950	9.60	9.60	1950	1950	9.60	9.60	1820	1820	9.60	9.60	1820	1820	9.60	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 8.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 32 x 32

Designation		W 14 x211								W 14 x193							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.50 %	0	5980	0.0	2080	2070	6720	0.0	2550	2440	5840	0.0	1970	1980	6520	0.0	2400	2340
Ar(in²)	11	5860	0.2	1870	1860	6570	0.2	2290	2200	5720	0.2	1770	1780	6370	0.2	2160	2100
= 5.08	13	5810	0.3	1640	1630	6510	0.3	2010	1930	5670	0.3	1550	1560	6310	0.3	1890	1840
	17	5700	0.4	1400	1400	6360	0.4	1720	1650	5560	0.4	1330	1330	6160	0.4	1620	1580
4-#10	21	5550	0.5	1170	1160	6180	0.5	1430	1380	5410	0.5	1110	1110	5980	0.5	1350	1310
2x-2y	25	5380	0.7	700	698	5960	0.7	859	825	5240	0.7	664	667	5770	0.7	809	788
	40	4560	0.9	233	232	4950	0.9	286	275	4410	0.9	221	222	4770	0.9	269	262
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1730	1730	9.60	9.60	1730	1730	9.60	9.60	1640	1640	9.60	9.60	1640	1640	9.60	9.60
.99 %	0	6140	0.0	2380	2270	6880	0.0	2850	2650	6010	0.0	2270	2180	6680	0.0	2700	2540
Ar(in²)	11	6010	0.2	2140	2050	6720	0.2	2560	2380	5880	0.2	2040	1960	6520	0.2	2430	2290
=10.16	13	5960	0.3	1870	1790	6660	0.3	2240	2080	5830	0.3	1790	1720	6460	0.3	2130	2000
	17	5840	0.4	1600	1530	6500	0.4	1920	1790	5700	0.4	1530	1470	6300	0.4	1820	1710
8-#10	21	5690	0.5	1340	1280	6310	0.5	1600	1490	5550	0.5	1280	1230	6110	0.5	1520	1430
4x-2y	25	5510	0.7	802	767	6090	0.7	960	893	5360	0.7	765	735	5890	0.7	910	857
	40	4640	0.9	267	255	5030	0.9	320	297	4500	0.9	255	245	4840	0.9	303	285
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1730	1730	9.60	9.60	1730	1730	9.60	9.60	1640	1640	9.60	9.60	1640	1640	9.60	9.60
1.98 %	0	6460	0.0	2910	2690	7200	0.0	3380	3050	6330	0.0	2800	2610	7000	0.0	3230	2940
Ar(in²)	11	6320	0.2	2620	2420	7030	0.2	3040	2740	6180	0.2	2520	2350	6830	0.2	2910	2650
=20.32	13	6270	0.3	2290	2120	6960	0.3	2660	2400	6130	0.3	2210	2060	6760	0.3	2540	2320
	17	6130	0.4	1960	1810	6790	0.4	2280	2060	5990	0.4	1890	1760	6590	0.4	2180	1990
16-#10	21	5960	0.5	1640	1510	6580	0.5	1900	1720	5820	0.5	1580	1470	6380	0.5	1820	1660
6x-4y	25	5760	0.7	981	907	6330	0.7	1140	1030	5610	0.7	945	882	6140	0.7	1090	993
	40	4810	0.9	327	302	5180	0.9	380	343	4660	0.9	315	294	4990	0.9	363	331
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1720	1720	9.60	9.60	1720	1720	9.60	9.60	1630	1630	9.60	9.60	1630	1630	9.60	9.60
3.05 %	0	6810	0.0	3340	3300	7550	0.0	3800	3670	6670	0.0	3240	3210	7350	0.0	3660	3560
Ar(in²)	11	6650	0.2	3010	2970	7350	0.2	3420	3300	6510	0.2	2910	2890	7150	0.2	3290	3210
=31.20	13	6590	0.3	2630	2600	7280	0.3	3000	2890	6450	0.3	2550	2530	7080	0.3	2880	2810
	17	6430	0.4	2260	2230	7090	0.4	2570	2480	6290	0.4	2180	2170	6890	0.4	2470	2410
20-#11	21	6250	0.5	1880	1860	6860	0.5	2140	2060	6100	0.5	1820	1810	6660	0.5	2060	2000
6x-6y	25	6030	0.7	1130	1110	6590	0.7	1280	1240	5880	0.7	1090	1080	6390	0.7	1230	1200
	40	4980	0.9	376	371	5340	0.9	427	412	4830	0.9	364	361	5140	0.9	411	400
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1720	1720	9.60	9.60	1720	1720	9.60	9.60	1620	1620	9.60	9.60	1620	1620	9.60	9.60
4.39 %	0	7250	0.0	3980	3870	7980	0.0	4440	4230	7110	0.0	3880	3790	7780	0.0	4290	4130
Ar(in²)	11	7060	0.2	3580	3480	7760	0.2	3990	3810	6920	0.2	3490	3410	7560	0.2	3860	3710
=45.00	13	6990	0.3	3140	3050	7680	0.3	3500	3330	6850	0.3	3050	2980	7480	0.3	3380	3250
	17	6820	0.4	2690	2610	7470	0.4	3000	2860	6680	0.4	2620	2560	7270	0.4	2900	2790
20-#14	21	6610	0.5	2240	2180	7210	0.5	2500	2380	6460	0.5	2180	2130	7010	0.5	2410	2320
6x-6y	25	6360	0.7	1340	1310	6910	0.7	1500	1430	6210	0.7	1310	1280	6710	0.7	1450	1390
	40	5190	0.9	448	435	5520	0.9	499	475	5030	0.9	436	426	5330	0.9	482	464
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1710	1710	9.60	9.60	1710	1710	9.60	9.60	1620	1620	9.60	9.60	1620	1620	9.60	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²),   Cey = Pey(KyLy)²/10000. (kip-ft²),   KL in ft,   rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 32

Designation		W 14 x176								W 14 x159							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	5710	0.0	1870	1880	6330	0.0	2260	2230	5580	0.0	1760	1780	6130	0.0	2120	2120
Ar(in²)	11	5590	0.2	1680	1700	6180	0.2	2030	2010	5450	0.2	1590	1600	5980	0.2	1910	1900
= 5.08	13	5540	0.3	1470	1480	6120	0.3	1780	1760	5400	0.3	1390	1400	5920	0.3	1670	1670
	17	5420	0.4	1260	1270	5970	0.4	1520	1500	5280	0.4	1190	1200	5780	0.4	1430	1430
4-#10	21	5270	0.5	1050	1060	5790	0.5	1270	1250	5130	0.5	992	1000	5600	0.5	1190	1190
2x-2y	25	5100	0.7	629	635	5580	0.7	761	752	4960	0.7	595	601	5390	0.7	714	714
	40	4270	0.9	209	211	4590	0.9	253	250	4130	0.9	198	200	4410	0.9	238	238
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1550	1550	9.60	9.60	1550	1550	9.60	9.60	1460	1460	9.60	9.60	1460	1460	9.60	9.60
.99 %	0	5870	0.0	2170	2090	6490	0.0	2560	2430	5740	0.0	2060	1990	6290	0.0	2420	2320
Ar(in²)	11	5740	0.2	1950	1880	6330	0.2	2300	2190	5600	0.2	1860	1790	6130	0.2	2170	2090
=10.16	13	5690	0.3	1710	1650	6270	0.3	2010	1920	5550	0.3	1630	1570	6070	0.3	1900	1830
	17	5560	0.4	1460	1410	6110	0.4	1730	1640	5430	0.4	1390	1340	5920	0.4	1630	1560
8-#10	21	5410	0.5	1220	1180	5930	0.5	1440	1370	5270	0.5	1160	1120	5730	0.5	1360	1300
4x-2y	25	5230	0.7	731	705	5700	0.7	862	821	5080	0.7	696	671	5510	0.7	815	782
	40	4360	0.9	243	235	4670	0.9	287	273	4210	0.9	232	223	4480	0.9	271	260
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1550	1550	9.60	9.60	1550	1550	9.60	9.60	1460	1460	9.60	9.60	1460	1460	9.60	9.60
1.98 %	0	6190	0.0	2700	2540	6810	0.0	3090	2840	6060	0.0	2600	2450	6610	0.0	2950	2720
Ar(in²)	11	6050	0.2	2430	2290	6630	0.2	2780	2550	5910	0.2	2340	2210	6440	0.2	2650	2450
=20.32	13	5990	0.3	2130	2000	6560	0.3	2430	2230	5850	0.3	2040	1930	6370	0.3	2320	2140
	17	5850	0.4	1820	1720	6400	0.4	2080	1910	5710	0.4	1750	1660	6200	0.4	1990	1840
16-#10	21	5680	0.5	1520	1430	6190	0.5	1740	1600	5530	0.5	1460	1380	5990	0.5	1660	1530
6x-4y	25	5470	0.7	910	858	5950	0.7	1040	957	5330	0.7	876	827	5750	0.7	995	918
	40	4510	0.9	303	286	4810	0.9	347	319	4360	0.9	292	275	4620	0.9	331	306
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1540	1540	9.60	9.60	1540	1540	9.60	9.60	1450	1450	9.60	9.60	1450	1450	9.60	9.60
3.05 %	0	6540	0.0	3130	3120	7150	0.0	3520	3460	6400	0.0	3030	3020	6960	0.0	3380	3350
Ar(in²)	11	6370	0.2	2820	2810	6960	0.2	3160	3110	6240	0.2	2730	2720	6760	0.2	3040	3010
=31.20	13	6310	0.3	2470	2460	6880	0.3	2770	2720	6170	0.3	2390	2380	6690	0.3	2660	2630
	17	6150	0.4	2120	2110	6700	0.4	2370	2330	6010	0.4	2050	2040	6500	0.4	2280	2260
20-#11	21	5960	0.5	1760	1750	6470	0.5	1980	1950	5820	0.5	1710	1700	6270	0.5	1900	1880
6x-6y	25	5740	0.7	1060	1050	6200	0.7	1190	1170	5590	0.7	1020	1020	6000	0.7	1140	1130
	40	4680	0.9	352	350	4960	0.9	395	389	4520	0.9	341	339	4760	0.9	379	376
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1540	1540	9.60	9.60	1540	1540	9.60	9.60	1450	1450	9.60	9.60	1450	1450	9.60	9.60
4.39 %	0	6970	0.0	3770	3720	7590	0.0	4150	4020	6840	0.0	3670	3650	7400	0.0	4010	3910
Ar(in²)	11	6790	0.2	3400	3350	7370	0.2	3740	3620	6650	0.2	3310	3280	7170	0.2	3610	3520
=45.00	13	6710	0.3	2970	2930	7280	0.3	3270	3170	6570	0.3	2890	2870	7090	0.3	3160	3080
	17	6540	0.4	2550	2510	7070	0.4	2800	2710	6390	0.4	2480	2460	6870	0.4	2710	2640
20-#14	21	6320	0.5	2120	2090	6810	0.5	2340	2260	6170	0.5	2070	2050	6610	0.5	2260	2200
6x-6y	25	6060	0.7	1270	1260	6510	0.7	1400	1360	5910	0.7	1240	1230	6310	0.7	1350	1320
	40	4870	0.9	424	418	5130	0.9	467	452	4700	0.9	413	410	4930	0.9	451	439
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1530	1530	9.60	9.60	1530	1530	9.60	9.60	1440	1440	9.60	9.60	1440	1440	9.60	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 8.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 32

Designation		W 12 x336								W 12 x305							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	6960	0.0	2810	2530	8130	0.0	3530	2940	6710	0.0	2620	2420	7780	0.0	3260	2800
Ar(in²)	11	6840	0.2	2530	2280	7970	0.2	3170	2640	6590	0.2	2360	2180	7620	0.2	2930	2520
= 5.08	13	6790	0.3	2220	1990	7910	0.3	2780	2310	6550	0.3	2060	1900	7560	0.3	2570	2200
	17	6680	0.4	1900	1710	7750	0.4	2380	1980	6430	0.4	1770	1630	7400	0.4	2200	1890
4-#10	21	6530	0.5	1580	1420	7550	0.5	1980	1650	6290	0.5	1470	1360	7210	0.5	1830	1570
2x-2y	25	6360	0.7	949	854	7320	0.7	1190	990	6120	0.7	883	815	6990	0.7	1100	944
	40	5530	0.9	316	284	6220	0.9	396	330	5290	0.9	294	271	5900	0.9	366	314
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2380	2380	9.60	9.60	2380	2380	9.60	9.60	2220	2220	9.60	9.60	2220	2220	9.60	9.60
.99 %	0	7120	0.0	3110	2730	8300	0.0	3830	3130	6880	0.0	2920	2620	7940	0.0	3560	3000
Ar(in²)	11	6990	0.2	2800	2460	8120	0.2	3440	2820	6750	0.2	2630	2360	7770	0.2	3200	2700
=10.16	13	6940	0.3	2450	2150	8060	0.3	3010	2470	6700	0.3	2300	2060	7710	0.3	2800	2360
	17	6820	0.4	2100	1840	7890	0.4	2580	2120	6580	0.4	1970	1770	7550	0.4	2400	2020
8-#10	21	6670	0.5	1750	1540	7690	0.5	2150	1760	6430	0.5	1640	1470	7350	0.5	2000	1690
4x-2y	25	6490	0.7	1050	921	7450	0.7	1290	1060	6250	0.7	984	883	7110	0.7	1200	1010
	40	5620	0.9	350	307	6300	0.9	430	352	5390	0.9	328	294	5990	0.9	400	337
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2380	2380	9.60	9.60	2380	2380	9.60	9.60	2220	2220	9.60	9.60	2220	2220	9.60	9.60
1.98 %	0	7440	0.0	3640	3130	8620	0.0	4350	3530	7200	0.0	3450	3020	8260	0.0	4090	3400
Ar(in²)	11	7300	0.2	3280	2820	8430	0.2	3920	3180	7060	0.2	3100	2720	8080	0.2	3680	3060
=20.32	13	7250	0.3	2870	2470	8360	0.3	3430	2780	7000	0.3	2720	2380	8010	0.3	3220	2680
	17	7120	0.4	2460	2110	8180	0.4	2940	2380	6870	0.4	2330	2040	7840	0.4	2760	2290
16-#10	21	6950	0.5	2050	1760	7960	0.5	2450	1990	6710	0.5	1940	1700	7620	0.5	2300	1910
6x-4y	25	6760	0.7	1230	1060	7710	0.7	1470	1190	6510	0.7	1160	1020	7370	0.7	1380	1150
	40	5810	0.9	409	352	6470	0.9	489	397	5570	0.9	387	339	6160	0.9	459	382
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2370	2370	9.60	9.60	2370	2370	9.60	9.60	2210	2210	9.60	9.60	2210	2210	9.60	9.60
3.05 %	0	7780	0.0	4050	3750	8960	0.0	4760	4150	7540	0.0	3850	3640	8610	0.0	4490	4020
Ar(in²)	11	7630	0.2	3640	3380	8760	0.2	4280	3730	7390	0.2	3470	3270	8410	0.2	4040	3610
=31.20	13	7570	0.3	3190	2950	8680	0.3	3750	3270	7330	0.3	3030	2870	8330	0.3	3540	3160
	17	7430	0.4	2730	2530	8490	0.4	3210	2800	7180	0.4	2600	2460	8140	0.4	3030	2710
20-#11	21	7250	0.5	2280	2110	8250	0.5	2680	2330	7000	0.5	2170	2050	7910	0.5	2530	2260
6x-6y	25	7040	0.7	1370	1270	7980	0.7	1610	1400	6790	0.7	1300	1230	7630	0.7	1520	1360
	40	6010	0.9	455	421	6650	0.9	535	466	5760	0.9	433	409	6330	0.9	505	451
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2370	2370	9.60	9.60	2370	2370	9.60	9.60	2200	2200	9.60	9.60	2200	2200	9.60	9.60
4.39 %	0	8220	0.0	4680	4310	9400	0.0	5380	4700	7980	0.0	4490	4200	9040	0.0	5120	4570
Ar(in²)	11	8050	0.2	4210	3880	9180	0.2	4850	4230	7810	0.2	4040	3780	8820	0.2	4610	4110
=45.00	13	7990	0.3	3690	3390	9090	0.3	4240	3700	7740	0.3	3540	3310	8740	0.3	4030	3600
	17	7820	0.4	3160	2910	8880	0.4	3630	3170	7580	0.4	3030	2830	8530	0.4	3450	3080
20-#14	21	7620	0.5	2630	2420	8620	0.5	3030	2650	7370	0.5	2530	2360	8270	0.5	2880	2570
6x-6y	25	7380	0.7	1580	1450	8310	0.7	1820	1590	7130	0.7	1520	1420	7970	0.7	1730	1540
	40	6250	0.9	526	484	6870	0.9	605	529	5990	0.9	505	472	6540	0.9	575	514
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2360	2360	9.60	9.60	2360	2360	9.60	9.60	2200	2200	9.60	9.60	2200	2200	9.60	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 32 x 32

Designation		W 12 x279								W 12 x252							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.50 %	0	6510	0.0	2460	2320	7490	0.0	3040	2680	6300	0.0	2300	2210	7190	0.0	2820	2560
Ar(in²)	11	6390	0.2	2210	2090	7330	0.2	2730	2420	6180	0.2	2070	1990	7030	0.2	2540	2300
= 5.08	13	6340	0.3	1930	1830	7260	0.3	2390	2110	6140	0.3	1810	1740	6970	0.3	2220	2020
	17	6230	0.4	1660	1570	7110	0.4	2050	1810	6020	0.4	1550	1490	6820	0.4	1900	1730
4-#10	21	6080	0.5	1380	1300	6920	0.5	1710	1510	5880	0.5	1290	1250	6630	0.5	1590	1440
2x-2y	25	5910	0.7	828	782	6700	0.7	1020	905	5710	0.7	774	747	6410	0.7	951	863
	40	5090	0.9	276	260	5640	0.9	341	301	4880	0.9	258	249	5370	0.9	317	287
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2080	2080	9.60	9.60	2080	2080	9.60	9.60	1950	1950	9.60	9.60	1950	1950	9.60	9.60
.99 %	0	6670	0.0	2760	2520	7650	0.0	3340	2880	6460	0.0	2600	2410	7350	0.0	3120	2760
Ar(in²)	11	6540	0.2	2480	2270	7480	0.2	3000	2600	6340	0.2	2340	2170	7180	0.2	2800	2480
=10.16	13	6500	0.3	2170	1980	7420	0.3	2630	2270	6290	0.3	2040	1900	7120	0.3	2450	2170
	17	6370	0.4	1860	1700	7260	0.4	2250	1950	6170	0.4	1750	1630	6960	0.4	2100	1860
8-#10	21	6220	0.5	1550	1420	7060	0.5	1880	1620	6010	0.5	1460	1360	6770	0.5	1750	1550
4x-2y	25	6040	0.7	929	850	6830	0.7	1130	973	5840	0.7	876	815	6540	0.7	1050	931
	40	5180	0.9	309	283	5720	0.9	375	324	4970	0.9	292	271	5450	0.9	350	310
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2080	2080	9.60	9.60	2080	2080	9.60	9.60	1940	1940	9.60	9.60	1940	1940	9.60	9.60
1.98 %	0	6990	0.0	3290	2920	7970	0.0	3870	3280	6790	0.0	3130	2820	7670	0.0	3650	3160
Ar(in²)	11	6850	0.2	2960	2630	7790	0.2	3480	2950	6650	0.2	2810	2540	7490	0.2	3280	2840
=20.32	13	6800	0.3	2590	2300	7720	0.3	3040	2580	6590	0.3	2460	2220	7420	0.3	2870	2490
	17	6670	0.4	2220	1970	7540	0.4	2610	2220	6460	0.4	2110	1900	7250	0.4	2460	2130
16-#10	21	6500	0.5	1850	1640	7330	0.5	2170	1850	6290	0.5	1760	1580	7040	0.5	2050	1780
6x-4y	25	6300	0.7	1110	986	7080	0.7	1300	1110	6090	0.7	1060	950	6790	0.7	1230	1070
	40	5360	0.9	369	328	5890	0.9	434	369	5150	0.9	351	316	5610	0.9	410	355
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2080	2080	9.60	9.60	2080	2080	9.60	9.60	1940	1940	9.60	9.60	1940	1940	9.60	9.60
3.05 %	0	7340	0.0	3690	3540	8310	0.0	4270	3900	7130	0.0	3530	3440	8010	0.0	4050	3780
Ar(in²)	11	7180	0.2	3320	3190	8110	0.2	3840	3510	6970	0.2	3180	3090	7820	0.2	3640	3400
=31.20	13	7120	0.3	2910	2790	8040	0.3	3360	3070	6910	0.3	2780	2710	7740	0.3	3190	2980
	17	6980	0.4	2490	2390	7850	0.4	2880	2630	6760	0.4	2380	2320	7550	0.4	2730	2550
20-#11	21	6790	0.5	2080	1990	7620	0.5	2400	2190	6580	0.5	1990	1930	7320	0.5	2280	2130
6x-6y	25	6580	0.7	1250	1200	7340	0.7	1440	1320	6360	0.7	1190	1160	7050	0.7	1370	1280
	40	5550	0.9	415	398	6060	0.9	480	438	5330	0.9	397	386	5780	0.9	455	425
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2070	2070	9.60	9.60	2070	2070	9.60	9.60	1930	1930	9.60	9.60	1930	1930	9.60	9.60
4.39 %	0	7770	0.0	4330	4100	8750	0.0	4890	4460	7570	0.0	4170	4000	8450	0.0	4680	4340
Ar(in²)	11	7600	0.2	3900	3690	8530	0.2	4400	4010	7390	0.2	3760	3600	8230	0.2	4210	3900
=45.00	13	7530	0.3	3410	3230	8440	0.3	3850	3510	7320	0.3	3290	3150	8140	0.3	3680	3410
	17	7370	0.4	2920	2770	8230	0.4	3300	3010	7150	0.4	2820	2700	7940	0.4	3160	2930
20-#14	21	7160	0.5	2440	2310	7980	0.5	2750	2510	6950	0.5	2350	2250	7680	0.5	2630	2440
6x-6y	25	6920	0.7	1460	1380	7680	0.7	1650	1500	6700	0.7	1410	1350	7380	0.7	1580	1460
	40	5770	0.9	487	461	6260	0.9	550	501	5550	0.9	469	449	5980	0.9	526	487
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2060	2060	9.60	9.60	2060	2060	9.60	9.60	1920	1920	9.60	9.60	1920	1920	9.60	9.60

Notes : 1. Cex = $Pex(KxLx)^2/10000$. (kip-ft²), Cey = $Pey(KyLy)^2/10000$. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 32

Designation		W 12 x230								W 12 x210							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	6130	0.0	2170	2120	6940	0.0	2640	2460	5980	0.0	2050	2040	6710	0.0	2480	2360
Ar(in²)	11	6010	0.2	1950	1910	6780	0.2	2380	2210	5860	0.2	1850	1830	6560	0.2	2240	2120
= 5.08	13	5970	0.3	1710	1670	6720	0.3	2080	1940	5810	0.3	1620	1600	6500	0.3	1960	1860
	17	5850	0.4	1460	1430	6580	0.4	1780	1660	5690	0.4	1390	1370	6350	0.4	1680	1590
4-#10	21	5700	0.5	1220	1190	6390	0.5	1490	1380	5550	0.5	1150	1150	6170	0.5	1400	1330
2x-2y	25	5530	0.7	732	716	6180	0.7	892	829	5370	0.7	692	687	5960	0.7	838	795
	40	4710	0.9	244	238	5150	0.9	297	276	4550	0.9	230	229	4940	0.9	279	265
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1830	1830	9.60	9.60	1830	1830	9.60	9.60	1730	1730	9.60	9.60	1730	1730	9.60	9.60
.99 %	0	6290	0.0	2470	2330	7100	0.0	2940	2660	6140	0.0	2350	2240	6870	0.0	2780	2560
Ar(in²)	11	6170	0.2	2220	2090	6940	0.2	2650	2390	6010	0.2	2120	2010	6710	0.2	2510	2300
=10.16	13	6120	0.3	1940	1830	6870	0.3	2320	2090	5960	0.3	1850	1760	6650	0.3	2190	2010
	17	5990	0.4	1670	1570	6720	0.4	1990	1790	5840	0.4	1590	1510	6490	0.4	1880	1730
8-#10	21	5840	0.5	1390	1310	6530	0.5	1660	1500	5680	0.5	1320	1260	6300	0.5	1570	1440
4x-2y	25	5660	0.7	833	784	6300	0.7	993	897	5500	0.7	793	755	6080	0.7	939	863
	40	4800	0.9	277	261	5230	0.9	331	299	4640	0.9	264	251	5020	0.9	313	287
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1830	1830	9.60	9.60	1830	1830	9.60	9.60	1730	1730	9.60	9.60	1730	1730	9.60	9.60
1.98 %	0	6620	0.0	3000	2730	7420	0.0	3470	3060	6460	0.0	2880	2640	7190	0.0	3310	2960
Ar(in²)	11	6470	0.2	2700	2460	7240	0.2	3130	2750	6320	0.2	2590	2380	7020	0.2	2980	2660
=20.32	13	6420	0.3	2360	2150	7170	0.3	2740	2410	6260	0.3	2270	2080	6950	0.3	2610	2330
	17	6280	0.4	2020	1840	7000	0.4	2340	2060	6120	0.4	1950	1780	6780	0.4	2240	2000
16-#10	21	6110	0.5	1690	1540	6790	0.5	1950	1720	5950	0.5	1620	1490	6570	0.5	1860	1660
6x-4y	25	5920	0.7	1010	921	6550	0.7	1170	1030	5750	0.7	973	891	6330	0.7	1120	998
	40	4970	0.9	337	307	5390	0.9	390	344	4800	0.9	324	297	5170	0.9	372	332
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1820	1820	9.60	9.60	1820	1820	9.60	9.60	1720	1720	9.60	9.60	1720	1720	9.60	9.60
3.05 %	0	6960	0.0	3410	3350	7770	0.0	3880	3680	6800	0.0	3290	3260	7540	0.0	3720	3580
Ar(in²)	11	6800	0.2	3060	3020	7570	0.2	3490	3310	6640	0.2	2960	2940	7340	0.2	3340	3220
=31.20	13	6740	0.3	2680	2640	7490	0.3	3050	2900	6580	0.3	2590	2570	7270	0.3	2930	2820
	17	6590	0.4	2300	2260	7310	0.4	2620	2480	6430	0.4	2220	2200	7080	0.4	2510	2420
20-#11	21	6400	0.5	1920	1880	7080	0.5	2180	2070	6240	0.5	1850	1840	6850	0.5	2090	2010
6x-6y	25	6190	0.7	1150	1130	6810	0.7	1310	1240	6020	0.7	1110	1100	6580	0.7	1250	1210
	40	5150	0.9	383	376	5550	0.9	436	413	4980	0.9	370	367	5330	0.9	418	402
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1820	1820	9.60	9.60	1820	1820	9.60	9.60	1710	1710	9.60	9.60	1710	1710	9.60	9.60
4.39 %	0	7400	0.0	4050	3910	8200	0.0	4500	4240	7240	0.0	3930	3830	7980	0.0	4350	4140
Ar(in²)	11	7220	0.2	3640	3520	7980	0.2	4050	3810	7060	0.2	3540	3440	7760	0.2	3910	3720
=45.00	13	7150	0.3	3190	3080	7900	0.3	3550	3340	6990	0.3	3100	3010	7670	0.3	3420	3260
	17	6980	0.4	2730	2640	7690	0.4	3040	2860	6820	0.4	2660	2580	7460	0.4	2930	2790
20-#14	21	6770	0.5	2280	2200	7430	0.5	2530	2380	6600	0.5	2210	2150	7200	0.5	2440	2330
6x-6y	25	6520	0.7	1370	1320	7130	0.7	1520	1430	6350	0.7	1330	1290	6910	0.7	1470	1400
	40	5360	0.9	455	440	5740	0.9	506	476	5180	0.9	442	430	5520	0.9	488	465
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1810	1810	9.60	9.60	1810	1810	9.60	9.60	1700	1700	9.60	9.60	1700	1700	9.60	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85   f'c : 8.0 ksi NW
φb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 32 x 32

Designation		W 12 x190								W 12 x170							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	5820	0.0	1940	1940	6480	0.0	2330	2250	5660	0.0	1830	1840	6260	0.0	2180	2140
Ar(in²)	11	5700	0.2	1740	1750	6330	0.2	2100	2030	5540	0.2	1640	1660	6110	0.2	1960	1930
= 5.08	13	5650	0.3	1530	1530	6270	0.3	1830	1770	5490	0.3	1440	1450	6050	0.3	1710	1690
	17	5530	0.4	1310	1310	6120	0.4	1570	1520	5370	0.4	1230	1240	5900	0.4	1470	1450
4-#10	21	5380	0.5	1090	1090	5940	0.5	1310	1270	5220	0.5	1030	1040	5720	0.5	1220	1200
2x-2y	25	5210	0.7	654	655	5730	0.7	785	759	5050	0.7	616	622	5510	0.7	734	722
	40	4390	0.9	218	218	4730	0.9	261	253	4220	0.9	205	207	4530	0.9	244	240
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1620	1620	9.60	9.60	1620	1620	9.60	9.60	1520	1520	9.60	9.60	1520	1520	9.60	9.60
.99 %	0	5980	0.0	2240	2140	6640	0.0	2630	2450	5830	0.0	2130	2050	6420	0.0	2470	2340
Ar(in²)	11	5850	0.2	2010	1930	6480	0.2	2360	2210	5690	0.2	1910	1840	6260	0.2	2230	2110
=10.16	13	5800	0.3	1760	1690	6420	0.3	2070	1930	5640	0.3	1670	1610	6200	0.3	1950	1850
	17	5670	0.4	1510	1450	6270	0.4	1770	1660	5520	0.4	1440	1380	6040	0.4	1670	1580
8-#10	21	5520	0.5	1260	1210	6080	0.5	1480	1380	5360	0.5	1200	1150	5860	0.5	1390	1320
4x-2y	25	5340	0.7	755	723	5860	0.7	886	827	5180	0.7	717	691	5640	0.7	835	790
	40	4470	0.9	251	241	4810	0.9	295	275	4300	0.9	239	230	4600	0.9	278	263
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1620	1620	9.60	9.60	1620	1620	9.60	9.60	1520	1520	9.60	9.60	1520	1520	9.60	9.60
1.98 %	0	6300	0.0	2770	2550	6960	0.0	3160	2850	6150	0.0	2660	2470	6740	0.0	3000	2750
Ar(in²)	11	6160	0.2	2490	2290	6790	0.2	2840	2570	6000	0.2	2390	2220	6560	0.2	2700	2470
=20.32	13	6100	0.3	2180	2010	6720	0.3	2490	2250	5940	0.3	2090	1950	6500	0.3	2370	2160
	17	5960	0.4	1870	1720	6550	0.4	2130	1930	5800	0.4	1790	1670	6330	0.4	2030	1850
16-#10	21	5790	0.5	1560	1430	6340	0.5	1780	1610	5630	0.5	1490	1390	6120	0.5	1690	1540
6x-4y	25	5590	0.7	934	860	6100	0.7	1070	963	5420	0.7	896	834	5880	0.7	1010	926
	40	4630	0.9	311	286	4960	0.9	355	321	4460	0.9	298	278	4740	0.9	338	308
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1610	1610	9.60	9.60	1610	1610	9.60	9.60	1510	1510	9.60	9.60	1510	1510	9.60	9.60
3.05 %	0	6640	0.0	3180	3170	7310	0.0	3560	3470	6490	0.0	3070	3080	7090	0.0	3410	3370
Ar(in²)	11	6480	0.2	2860	2850	7110	0.2	3200	3130	6330	0.2	2760	2770	6890	0.2	3070	3030
=31.20	13	6420	0.3	2500	2500	7040	0.3	2800	2740	6260	0.3	2420	2420	6810	0.3	2680	2650
	17	6260	0.4	2150	2140	6850	0.4	2400	2350	6100	0.4	2070	2080	6630	0.4	2300	2270
20-#11	21	6070	0.5	1790	1780	6620	0.5	2000	1950	5910	0.5	1730	1730	6400	0.5	1920	1890
6x-6y	25	5850	0.7	1070	1070	6350	0.7	1200	1170	5680	0.7	1040	1040	6130	0.7	1150	1140
	40	4800	0.9	357	356	5110	0.9	400	390	4620	0.9	345	346	4890	0.9	383	378
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1610	1610	9.60	9.60	1610	1610	9.60	9.60	1500	1500	9.60	9.60	1500	1500	9.60	9.60
4.39 %	0	7080	0.0	3820	3740	7740	0.0	4190	4040	6930	0.0	3710	3650	7520	0.0	4040	3930
Ar(in²)	11	6900	0.2	3440	3360	7520	0.2	3770	3630	6740	0.2	3340	3280	7300	0.2	3640	3540
=45.00	13	6820	0.3	3010	2940	7440	0.3	3300	3180	6660	0.3	2920	2870	7210	0.3	3180	3090
	17	6650	0.4	2580	2520	7230	0.4	2830	2720	6480	0.4	2510	2460	7000	0.4	2730	2650
20-#14	21	6430	0.5	2150	2100	6970	0.5	2360	2270	6260	0.5	2090	2050	6740	0.5	2270	2210
6x-6y	25	6180	0.7	1290	1260	6670	0.7	1420	1360	6010	0.7	1250	1230	6440	0.7	1360	1330
	40	4990	0.9	429	420	5290	0.9	471	453	4810	0.9	417	410	5060	0.9	454	442
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1600	1600	9.60	9.60	1600	1600	9.60	9.60	1500	1500	9.60	9.60	1500	1500	9.60	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 32

Designation		W 12 x152								W							
Fy (ksi)		36				50											
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy								
.50 %	0	5520	0.0	1730	1750	6060	0.0	2040	2040								
Ar(in²)	11	5400	0.2	1550	1580	5900	0.2	1840	1830								
= 5.08	13	5350	0.3	1360	1380	5850	0.3	1610	1600								
	17	5230	0.4	1170	1180	5700	0.4	1380	1380								
4-#10	21	5080	0.5	971	984	5520	0.5	1150	1150								
2x-2y	25	4900	0.7	583	590	5310	0.7	688	687								
	40	4070	0.9	194	196	4330	0.9	229	229								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1430	1430	9.60	9.60	1430	1430	9.60	9.60								
.99 %	0	5680	0.0	2030	1960	6220	0.0	2340	2240								
Ar(in²)	11	5550	0.2	1830	1760	6060	0.2	2110	2020								
=10.16	13	5500	0.3	1600	1540	5990	0.3	1840	1760								
	17	5370	0.4	1370	1320	5840	0.4	1580	1510								
8-#10	21	5210	0.5	1140	1100	5650	0.5	1320	1260								
4x-2y	25	5030	0.7	684	660	5430	0.7	789	755								
	40	4150	0.9	228	220	4410	0.9	263	251								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1420	1420	9.60	9.60	1420	1420	9.60	9.60								
1.98 %	0	6010	0.0	2560	2400	6540	0.0	2870	2640								
Ar(in²)	11	5860	0.2	2300	2160	6360	0.2	2580	2380								
=20.32	13	5800	0.3	2020	1890	6290	0.3	2260	2080								
	17	5650	0.4	1730	1620	6120	0.4	1940	1780								
16-#10	21	5480	0.5	1440	1350	5910	0.5	1610	1490								
6x-4y	25	5270	0.7	863	810	5670	0.7	968	891								
	40	4300	0.9	287	270	4550	0.9	322	297								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1420	1420	9.60	9.60	1420	1420	9.60	9.60								
3.05 %	0	6350	0.0	2970	2980	6880	0.0	3270	3260								
Ar(in²)	11	6180	0.2	2680	2690	6680	0.2	2950	2940								
=31.20	13	6120	0.3	2340	2350	6610	0.3	2580	2570								
	17	5960	0.4	2010	2010	6420	0.4	2210	2200								
20-#11	21	5760	0.5	1670	1680	6190	0.5	1840	1840								
6x-6y	25	5530	0.7	1000	1010	5920	0.7	1100	1100								
	40	4450	0.9	334	335	4690	0.9	368	367								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1410	1410	9.60	9.60	1410	1410	9.60	9.60								
4.39 %	0	6790	0.0	3610	3580	7320	0.0	3910	3830								
Ar(in²)	11	6590	0.2	3250	3220	7090	0.2	3520	3450								
=45.00	13	6520	0.3	2850	2820	7010	0.3	3080	3010								
	17	6330	0.4	2440	2420	6790	0.4	2640	2580								
20-#14	21	6110	0.5	2030	2010	6530	0.5	2200	2150								
6x-6y	25	5850	0.7	1220	1210	6230	0.7	1320	1290								
	40	4630	0.9	406	402	4850	0.9	439	430								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1400	1400	9.60	9.60	1400	1400	9.60	9.60								

Notes :
1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 32

Designation		W 14 x426								W 14 x398							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.54 %	0	7120	0.0	3410	2550	8610	0.0	4410	3060	6910	0.0	3210	2450	8300	0.0	4140	2940
Ar(in²)	11	6980	0.2	3070	2290	8400	0.2	3960	2760	6770	0.2	2890	2200	8100	0.2	3720	2650
= 4.80	13	6930	0.3	2680	2000	8320	0.3	3470	2410	6720	0.3	2530	1930	8020	0.3	3260	2320
	17	6790	0.4	2300	1720	8130	0.4	2970	2070	6580	0.4	2170	1650	7830	0.4	2790	1980
8-# 7	21	6620	0.5	1920	1430	7880	0.5	2480	1720	6410	0.5	1810	1380	7590	0.5	2330	1650
4x-2y	25	6420	0.7	1150	859	7600	0.7	1490	1030	6220	0.7	1080	825	7310	0.7	1400	992
	40	5470	0.9	383	286	6250	0.9	495	344	5270	0.9	361	275	6000	0.9	465	330
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2770	2120	9.60	8.40	2770	2120	9.60	8.40	2630	2010	9.60	8.40	2630	2010	9.60	8.40
1.00 %	0	7260	0.0	3640	2770	8740	0.0	4640	3290	7040	0.0	3440	2670	8440	0.0	4370	3160
Ar(in²)	11	7110	0.2	3270	2490	8530	0.2	4170	2960	6900	0.2	3100	2400	8230	0.2	3930	2850
= 9.00	13	7050	0.3	2860	2180	8450	0.3	3650	2590	6840	0.3	2710	2100	8150	0.3	3440	2490
	17	6910	0.4	2460	1870	8240	0.4	3130	2220	6700	0.4	2320	1800	7950	0.4	2950	2140
4-#14	21	6730	0.5	2050	1560	7990	0.5	2610	1850	6530	0.5	1940	1500	7700	0.5	2460	1780
2x-2y	25	6530	0.7	1230	934	7700	0.7	1560	1110	6320	0.7	1160	901	7410	0.7	1470	1070
	40	5540	0.9	409	311	6310	0.9	521	369	5340	0.9	387	300	6060	0.9	491	355
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2770	2120	9.60	8.40	2770	2120	9.60	8.40	2620	2010	9.60	8.40	2620	2010	9.60	8.40
2.01 %	0	7540	0.0	4160	3040	9030	0.0	5160	3550	7330	0.0	3960	2940	8720	0.0	4880	3430
Ar(in²)	11	7380	0.2	3740	2740	8800	0.2	4640	3200	7170	0.2	3560	2650	8500	0.2	4400	3090
=18.00	13	7320	0.3	3270	2390	8710	0.3	4060	2800	7110	0.3	3120	2320	8410	0.3	3850	2700
	17	7170	0.4	2800	2050	8490	0.4	3480	2400	6960	0.4	2670	1990	8200	0.4	3300	2320
8-#14	21	6980	0.5	2340	1710	8230	0.5	2900	2000	6770	0.5	2230	1660	7930	0.5	2750	1930
4x-2y	25	6760	0.7	1400	1030	7920	0.7	1740	1200	6550	0.7	1340	993	7630	0.7	1650	1160
	40	5690	0.9	467	342	6450	0.9	580	399	5490	0.9	445	331	6190	0.9	549	386
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2760	2110	9.60	8.40	2760	2110	9.60	8.40	2620	2000	9.60	8.40	2620	2000	9.60	8.40
2.79 %	0	7760	0.0	4480	3270	9250	0.0	5480	3790	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	7590	0.2	4030	2950	9010	0.2	4930	3410	0	0.2	0	0	0	0.2	0	0
=24.96	13	7530	0.3	3530	2580	8920	0.3	4320	2980	0	0.3	0	0	0	0.3	0	0
	17	7360	0.4	3030	2210	8690	0.4	3700	2560	0	0.4	0	0	0	0.4	0	0
16-#11	21	7160	0.5	2520	1840	8410	0.5	3080	2130	0	0.5	0	0	0	0.5	0	0
6x-4y	25	6930	0.7	1510	1100	8080	0.7	1850	1280	0	0.7	0	0	0	0.7	0	0
	40	5810	0.9	504	368	6550	0.9	616	426	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2760	2110	9.60	8.40	2760	2110	9.60	8.40	0	0	.00	.00	0	0	.00	.00
3.57 %	0	7980	0.0	4920	3460	9470	0.0	5930	3980	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	7800	0.2	4430	3120	9220	0.2	5330	3580	0	0.2	0	0	0	0.2	0	0
=32.00	13	7730	0.3	3880	2730	9120	0.3	4670	3130	0	0.3	0	0	0	0.3	0	0
	17	7560	0.4	3320	2340	8880	0.4	4000	2690	0	0.4	0	0	0	0.4	0	0
8-#18	21	7350	0.5	2770	1950	8590	0.5	3330	2240	0	0.5	0	0	0	0.5	0	0
4x-2y	25	7100	0.7	1660	1170	8250	0.7	2000	1340	0	0.7	0	0	0	0.7	0	0
	40	5920	0.9	553	389	6650	0.9	666	447	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2750	2110	9.60	8.40	2750	2110	9.60	8.40	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 8.0 ksi NW

$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 28 x 32

Designation		W 14 x370								W 14 x342							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	6700	0.0	3020	2350	8000	0.0	3870	2820	6490	0.0	2830	2240	7690	0.0	3610	2690
Ar(in²)	11	6560	0.2	2720	2110	7800	0.2	3490	2530	6350	0.2	2550	2020	7490	0.2	3250	2420
= 4.80	13	6500	0.3	2380	1850	7720	0.3	3050	2220	6290	0.3	2230	1770	7420	0.3	2850	2120
	17	6370	0.4	2040	1580	7530	0.4	2610	1900	6160	0.4	1910	1510	7230	0.4	2440	1810
8-# 7	21	6210	0.5	1700	1320	7300	0.5	2180	1580	6000	0.5	1590	1260	7000	0.5	2030	1510
4x-2y	25	6010	0.7	1020	792	7030	0.7	1310	950	5800	0.7	955	757	6740	0.7	1220	906
	40	5080	0.9	339	264	5740	0.9	435	316	4880	0.9	318	252	5480	0.9	406	302
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2480	1900	9.60	8.40	2480	1900	9.60	8.40	2340	1790	9.60	8.40	2340	1790	9.60	8.40
1.00 %	0	6830	0.0	3250	2570	8130	0.0	4100	3040	6620	0.0	3060	2470	7820	0.0	3840	2910
Ar(in²)	11	6690	0.2	2930	2310	7920	0.2	3690	2730	6470	0.2	2760	2220	7620	0.2	3460	2620
= 9.00	13	6630	0.3	2560	2020	7840	0.3	3230	2390	6420	0.3	2410	1940	7540	0.3	3030	2290
	17	6490	0.4	2190	1740	7650	0.4	2770	2050	6280	0.4	2070	1670	7350	0.4	2590	1960
4-#14	21	6320	0.5	1830	1450	7410	0.5	2310	1710	6110	0.5	1720	1390	7110	0.5	2160	1640
2x-2y	25	6120	0.7	1100	867	7130	0.7	1390	1030	5910	0.7	1030	833	6840	0.7	1300	982
	40	5150	0.9	365	289	5800	0.9	461	341	4950	0.9	344	277	5550	0.9	432	327
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2480	1900	9.60	8.40	2480	1900	9.60	8.40	2340	1790	9.60	8.40	2340	1790	9.60	8.40
2.01 %	0	7120	0.0	3770	2840	8410	0.0	4620	3310	6900	0.0	3580	2740	8110	0.0	4360	3180
Ar(in²)	11	6960	0.2	3390	2560	8190	0.2	4160	2980	6750	0.2	3220	2470	7890	0.2	3930	2860
=18.00	13	6900	0.3	2970	2240	8110	0.3	3640	2600	6690	0.3	2820	2160	7810	0.3	3430	2500
	17	6750	0.4	2540	1920	7900	0.4	3120	2230	6530	0.4	2420	1850	7600	0.4	2940	2150
8-#14	21	6560	0.5	2120	1600	7640	0.5	2600	1860	6350	0.5	2010	1540	7350	0.5	2450	1790
4x-2y	25	6340	0.7	1270	959	7340	0.7	1560	1120	6130	0.7	1210	925	7050	0.7	1470	1070
	40	5290	0.9	424	319	5930	0.9	519	372	5090	0.9	402	308	5670	0.9	490	357
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2480	1900	9.60	8.40	2480	1900	9.60	8.40	2330	1790	9.60	8.40	2330	1790	9.60	8.40
3.01 %	0	7400	0.0	4130	3280	8700	0.0	4980	3740	7190	0.0	3940	3180	8390	0.0	4720	3610
Ar(in²)	11	7230	0.2	3720	2950	8460	0.2	4490	3360	7020	0.2	3550	2860	8160	0.2	4250	3250
=27.00	13	7160	0.3	3250	2580	8370	0.3	3920	2940	6950	0.3	3110	2500	8070	0.3	3720	2840
	17	7000	0.4	2790	2210	8150	0.4	3360	2520	6790	0.4	2660	2140	7850	0.4	3190	2440
12-#14	21	6800	0.5	2320	1840	7870	0.5	2800	2100	6590	0.5	2220	1790	7580	0.5	2660	2030
4x-4y	25	6560	0.7	1390	1110	7550	0.7	1680	1260	6350	0.7	1330	1070	7260	0.7	1590	1220
	40	5440	0.9	464	368	6050	0.9	560	420	5230	0.9	443	357	5790	0.9	531	406
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2470	1890	9.60	8.40	2470	1890	9.60	8.40	2330	1780	9.60	8.40	2330	1780	9.60	8.40
4.02 %	0	7680	0.0	4420	3710	8980	0.0	5250	4170	7470	0.0	4230	3610	8670	0.0	5000	4040
Ar(in²)	11	7500	0.2	3980	3340	8730	0.2	4720	3750	7290	0.2	3800	3250	8430	0.2	4500	3640
=36.00	13	7430	0.3	3480	2920	8630	0.3	4130	3280	7220	0.3	3330	2840	8330	0.3	3940	3180
	17	7250	0.4	2980	2500	8390	0.4	3540	2810	7040	0.4	2850	2440	8090	0.4	3380	2730
16-#14	21	7030	0.5	2480	2090	8100	0.5	2950	2340	6820	0.5	2380	2030	7800	0.5	2810	2270
4x-6y	25	6780	0.7	1490	1250	7760	0.7	1770	1410	6570	0.7	1430	1220	7470	0.7	1690	1360
	40	5580	0.9	496	417	6170	0.9	590	468	5370	0.9	475	405	5910	0.9	562	454
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2470	1890	9.60	8.40	2470	1890	9.60	8.40	2320	1780	9.60	8.40	2320	1780	9.60	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 28 x 32

Designation		W 14 x311								W 14 x283							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.54 %	0	6230	0.0	2630	2130	7320	0.0	3330	2540	6020	0.0	2450	2020	7010	0.0	3090	2410
Ar(in²)	11	6090	0.2	2370	1910	7130	0.2	3000	2290	5880	0.2	2200	1820	6820	0.2	2780	2170
= 4.80	13	6040	0.3	2070	1680	7060	0.3	2620	2000	5830	0.3	1930	1590	6750	0.3	2430	1900
	17	5910	0.4	1770	1440	6870	0.4	2250	1720	5690	0.4	1650	1360	6570	0.4	2080	1630
8-# 7	21	5740	0.5	1480	1200	6650	0.5	1870	1430	5530	0.5	1380	1140	6350	0.5	1740	1360
4x-2y	25	5550	0.7	886	717	6390	0.7	1120	858	5340	0.7	826	681	6100	0.7	1040	813
	40	4640	0.9	295	239	5180	0.9	374	286	4430	0.9	275	227	4910	0.9	347	271
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2170	1660	9.60	8.40	2170	1660	9.60	8.40	2030	1550	9.60	8.40	2030	1550	9.60	8.40
1.00 %	0	6360	0.0	2860	2350	7450	0.0	3560	2770	6150	0.0	2680	2240	7140	0.0	3320	2640
Ar(in²)	11	6220	0.2	2570	2120	7260	0.2	3210	2490	6010	0.2	2410	2020	6950	0.2	2980	2370
= 9.00	13	6160	0.3	2250	1850	7180	0.3	2810	2180	5950	0.3	2110	1770	6870	0.3	2610	2080
	17	6030	0.4	1930	1590	6990	0.4	2410	1870	5810	0.4	1810	1510	6690	0.4	2240	1780
4-#14	21	5860	0.5	1610	1320	6760	0.5	2000	1560	5640	0.5	1510	1260	6460	0.5	1870	1480
2x-2y	25	5660	0.7	965	793	6490	0.7	1200	933	5440	0.7	904	757	6200	0.7	1120	889
	40	4710	0.9	321	264	5230	0.9	400	311	4500	0.9	301	252	4970	0.9	373	296
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2170	1660	9.60	8.40	2170	1660	9.60	8.40	2030	1550	9.60	8.40	2030	1550	9.60	8.40
2.01 %	0	6650	0.0	3380	2630	7740	0.0	4080	3040	6430	0.0	3200	2520	7430	0.0	3830	2910
Ar(in²)	11	6490	0.2	3040	2360	7520	0.2	3670	2730	6280	0.2	2880	2270	7220	0.2	3450	2620
=18.00	13	6430	0.3	2660	2070	7440	0.3	3210	2390	6220	0.3	2520	1980	7130	0.3	3020	2290
	17	6280	0.4	2280	1770	7240	0.4	2750	2050	6060	0.4	2160	1700	6940	0.4	2590	1960
8-#14	21	6090	0.5	1900	1480	6990	0.5	2300	1710	5880	0.5	1800	1420	6690	0.5	2160	1630
4x-2y	25	5880	0.7	1140	886	6700	0.7	1380	1020	5660	0.7	1080	850	6410	0.7	1290	980
	40	4850	0.9	379	295	5360	0.9	459	341	4640	0.9	359	283	5090	0.9	431	326
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2170	1660	9.60	8.40	2170	1660	9.60	8.40	2020	1550	9.60	8.40	2020	1550	9.60	8.40
3.01 %	0	6930	0.0	3740	3060	8020	0.0	4440	3470	6720	0.0	3560	2950	7710	0.0	4200	3340
Ar(in²)	11	6760	0.2	3370	2750	7790	0.2	4000	3120	6550	0.2	3200	2660	7480	0.2	3780	3000
=27.00	13	6700	0.3	2940	2410	7700	0.3	3500	2730	6480	0.3	2800	2330	7400	0.3	3300	2630
	17	6530	0.4	2520	2070	7490	0.4	3000	2340	6320	0.4	2400	1990	7180	0.4	2830	2250
12-#14	21	6330	0.5	2100	1720	7220	0.5	2500	1950	6110	0.5	2000	1660	6920	0.5	2360	1880
4x-4y	25	6090	0.7	1260	1030	6910	0.7	1500	1170	5880	0.7	1200	996	6610	0.7	1420	1130
	40	4980	0.9	420	344	5470	0.9	499	390	4770	0.9	400	332	5200	0.9	471	375
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2160	1650	9.60	8.40	2160	1650	9.60	8.40	2020	1540	9.60	8.40	2020	1540	9.60	8.40
4.02 %	0	7220	0.0	4020	3490	8310	0.0	4730	3900	7000	0.0	3840	3390	7990	0.0	4480	3770
Ar(in²)	11	7030	0.2	3620	3150	8060	0.2	4260	3510	6820	0.2	3450	3050	7750	0.2	4030	3390
=36.00	13	6960	0.3	3170	2750	7960	0.3	3720	3070	6740	0.3	3020	2670	7660	0.3	3530	2970
	17	6780	0.4	2710	2360	7730	0.4	3190	2630	6560	0.4	2590	2290	7420	0.4	3020	2550
16-#14	21	6560	0.5	2260	1970	7450	0.5	2660	2190	6340	0.5	2160	1910	7140	0.5	2520	2120
4x-6y	25	6310	0.7	1360	1180	7110	0.7	1600	1320	6090	0.7	1290	1140	6810	0.7	1510	1270
	40	5110	0.9	452	393	5590	0.9	531	438	4890	0.9	431	381	5310	0.9	503	424
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2150	1650	9.60	8.40	2150	1650	9.60	8.40	2010	1540	9.60	8.40	2010	1540	9.60	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 32

Designation		W 14 x257								W 14 x233							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	5810	0.0	2280	1910	6710	0.0	2860	2280	5620	0.0	2130	1810	6440	0.0	2650	2160
Ar(in²)	11	5680	0.2	2050	1720	6530	0.2	2570	2060	5490	0.2	1920	1630	6260	0.2	2380	1950
= 4.80	13	5620	0.3	1800	1510	6460	0.3	2250	1800	5430	0.3	1680	1430	6190	0.3	2080	1700
	17	5490	0.4	1540	1290	6280	0.4	1930	1540	5300	0.4	1440	1220	6020	0.4	1790	1460
8-# 7	21	5330	0.5	1280	1080	6070	0.5	1610	1280	5140	0.5	1200	1020	5810	0.5	1490	1220
4x-2y	25	5140	0.7	770	645	5820	0.7	964	770	4950	0.7	719	611	5560	0.7	893	729
	40	4240	0.9	256	215	4660	0.9	321	256	4050	0.9	239	203	4430	0.9	297	243
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1890	1450	9.60	8.40	1890	1450	9.60	8.40	1770	1350	9.60	8.40	1770	1350	9.60	8.40
1.00 %	0	5950	0.0	2510	2140	6840	0.0	3090	2510	5760	0.0	2360	2040	6570	0.0	2880	2390
Ar(in²)	11	5800	0.2	2260	1930	6650	0.2	2780	2260	5610	0.2	2130	1830	6380	0.2	2590	2150
= 9.00	13	5750	0.3	1980	1680	6580	0.3	2430	1970	5560	0.3	1860	1600	6310	0.3	2270	1880
	17	5610	0.4	1700	1440	6400	0.4	2080	1690	5420	0.4	1590	1380	6130	0.4	1940	1610
4-#14	21	5440	0.5	1410	1200	6180	0.5	1740	1410	5250	0.5	1330	1150	5910	0.5	1620	1340
2x-2y	25	5240	0.7	848	722	5920	0.7	1040	846	5050	0.7	797	687	5660	0.7	971	805
	40	4300	0.9	282	240	4720	0.9	347	282	4120	0.9	265	229	4480	0.9	323	268
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1890	1450	9.60	8.40	1890	1450	9.60	8.40	1770	1350	9.60	8.40	1770	1350	9.60	8.40
2.01 %	0	6230	0.0	3030	2420	7130	0.0	3610	2780	6040	0.0	2880	2320	6860	0.0	3400	2660
Ar(in²)	11	6070	0.2	2730	2180	6920	0.2	3250	2500	5880	0.2	2590	2090	6650	0.2	3060	2390
=18.00	13	6010	0.3	2390	1910	6840	0.3	2840	2190	5820	0.3	2270	1820	6570	0.3	2670	2090
	17	5860	0.4	2050	1630	6650	0.4	2430	1880	5670	0.4	1940	1560	6380	0.4	2290	1790
8-#14	21	5670	0.5	1710	1360	6400	0.5	2030	1560	5480	0.5	1620	1300	6140	0.5	1910	1500
4x-2y	25	5450	0.7	1020	816	6120	0.7	1220	937	5260	0.7	972	782	5860	0.7	1150	897
	40	4430	0.9	341	272	4830	0.9	405	312	4240	0.9	324	260	4590	0.9	382	299
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1890	1440	9.60	8.40	1890	1440	9.60	8.40	1760	1350	9.60	8.40	1760	1350	9.60	8.40
3.01 %	0	6510	0.0	3390	2860	7410	0.0	3970	3210	6330	0.0	3240	2750	7140	0.0	3760	3090
Ar(in²)	11	6340	0.2	3050	2570	7190	0.2	3570	2890	6150	0.2	2920	2480	6920	0.2	3380	2780
=27.00	13	6270	0.3	2670	2250	7100	0.3	3120	2530	6080	0.3	2550	2170	6830	0.3	2960	2440
	17	6110	0.4	2290	1930	6890	0.4	2680	2170	5920	0.4	2190	1860	6620	0.4	2540	2090
12-#14	21	5900	0.5	1910	1610	6630	0.5	2230	1810	5710	0.5	1820	1550	6360	0.5	2110	1740
4x-4y	25	5670	0.7	1150	963	6330	0.7	1340	1080	5470	0.7	1090	929	6060	0.7	1270	1040
	40	4560	0.9	381	321	4940	0.9	446	361	4360	0.9	364	309	4700	0.9	422	347
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1880	1440	9.60	8.40	1880	1440	9.60	8.40	1750	1340	9.60	8.40	1750	1340	9.60	8.40
4.02 %	0	6800	0.0	3670	3290	7700	0.0	4250	3650	6610	0.0	3520	3190	7430	0.0	4040	3530
Ar(in²)	11	6610	0.2	3310	2960	7460	0.2	3820	3280	6420	0.2	3170	2870	7180	0.2	3630	3170
=36.00	13	6540	0.3	2890	2590	7360	0.3	3350	2870	6340	0.3	2770	2510	7090	0.3	3180	2780
	17	6360	0.4	2480	2220	7130	0.4	2870	2460	6160	0.4	2380	2150	6860	0.4	2720	2380
16-#14	21	6130	0.5	2070	1850	6850	0.5	2390	2050	5940	0.5	1980	1800	6580	0.5	2270	1980
4x-6y	25	5880	0.7	1240	1110	6530	0.7	1430	1230	5680	0.7	1190	1080	6260	0.7	1360	1190
	40	4680	0.9	413	370	5040	0.9	477	410	4480	0.9	396	359	4800	0.9	454	396
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1870	1430	9.60	8.40	1870	1430	9.60	8.40	1750	1340	9.60	8.40	1750	1340	9.60	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 32

Designation		W 14 x211								W 14 x193							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	5450	0.0	1990	1710	6190	0.0	2460	2050	5310	0.0	1890	1630	5990	0.0	2310	1950
Ar(in²)	11	5310	0.2	1800	1540	6010	0.2	2210	1840	5170	0.2	1700	1470	5810	0.2	2080	1750
= 4.80	13	5260	0.3	1570	1350	5940	0.3	1940	1610	5120	0.3	1490	1280	5750	0.3	1820	1540
	17	5130	0.4	1350	1160	5770	0.4	1660	1380	4990	0.4	1270	1100	5580	0.4	1560	1320
8-# 7	21	4960	0.5	1120	963	5570	0.5	1380	1150	4820	0.5	1060	917	5370	0.5	1300	1100
4x-2y	25	4770	0.7	673	578	5320	0.7	830	690	4630	0.7	637	550	5130	0.7	780	658
	40	3880	0.9	224	192	4210	0.9	276	230	3740	0.9	212	183	4040	0.9	260	219
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1650	1270	9.60	8.40	1650	1270	9.60	8.40	1560	1200	9.60	8.40	1560	1200	9.60	8.40
1.00 %	0	5580	0.0	2230	1940	6320	0.0	2690	2270	5450	0.0	2120	1860	6120	0.0	2540	2180
Ar(in²)	11	5440	0.2	2000	1750	6140	0.2	2420	2040	5300	0.2	1910	1670	5940	0.2	2290	1960
= 9.00	13	5380	0.3	1750	1530	6060	0.3	2120	1790	5240	0.3	1670	1460	5870	0.3	2000	1710
	17	5240	0.4	1500	1310	5890	0.4	1820	1530	5100	0.4	1430	1250	5690	0.4	1720	1470
4-#14	21	5070	0.5	1250	1090	5670	0.5	1510	1280	4930	0.5	1190	1050	5480	0.5	1430	1220
2x-2y	25	4870	0.7	751	654	5420	0.7	907	766	4730	0.7	715	627	5230	0.7	858	734
	40	3940	0.9	250	218	4260	0.9	302	255	3800	0.9	238	209	4090	0.9	286	244
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1650	1260	9.60	8.40	1650	1260	9.60	8.40	1560	1190	9.60	8.40	1560	1190	9.60	8.40
2.01 %	0	5870	0.0	2740	2220	6610	0.0	3210	2540	5730	0.0	2640	2140	6410	0.0	3060	2460
Ar(in²)	11	5710	0.2	2470	2000	6400	0.2	2890	2290	5570	0.2	2370	1920	6200	0.2	2760	2210
=18.00	13	5650	0.3	2160	1750	6320	0.3	2530	2000	5510	0.3	2080	1680	6130	0.3	2410	1930
	17	5490	0.4	1850	1500	6130	0.4	2170	1720	5350	0.4	1780	1440	5930	0.4	2070	1660
8-#14	21	5300	0.5	1540	1250	5900	0.5	1810	1430	5160	0.5	1480	1200	5700	0.5	1720	1380
4x-2y	25	5080	0.7	926	749	5620	0.7	1080	858	4940	0.7	890	721	5430	0.7	1030	828
	40	4070	0.9	308	249	4370	0.9	361	286	3920	0.9	296	240	4190	0.9	344	276
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1640	1260	9.60	8.40	1640	1260	9.60	8.40	1550	1190	9.60	8.40	1550	1190	9.60	8.40
3.01 %	0	6150	0.0	3110	2660	6890	0.0	3570	2980	6020	0.0	3000	2580	6690	0.0	3420	2880
Ar(in²)	11	5980	0.2	2800	2390	6670	0.2	3210	2680	5840	0.2	2700	2320	6470	0.2	3080	2600
=27.00	13	5910	0.3	2450	2090	6580	0.3	2810	2350	5770	0.3	2360	2030	6380	0.3	2700	2270
	17	5740	0.4	2100	1790	6370	0.4	2410	2010	5600	0.4	2020	1740	6170	0.4	2310	1950
12-#14	21	5530	0.5	1750	1500	6120	0.5	2010	1680	5390	0.5	1690	1450	5920	0.5	1930	1620
4x-4y	25	5290	0.7	1050	897	5820	0.7	1200	1010	5150	0.7	1010	869	5620	0.7	1160	973
	40	4180	0.9	349	299	4470	0.9	401	335	4030	0.9	337	289	4290	0.9	385	324
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1640	1260	9.60	8.40	1640	1260	9.60	8.40	1550	1180	9.60	8.40	1550	1180	9.60	8.40
4.02 %	0	6440	0.0	3390	3100	7180	0.0	3840	3410	6300	0.0	3280	3020	6980	0.0	3700	3320
Ar(in²)	11	6240	0.2	3050	2790	6930	0.2	3460	3070	6100	0.2	2950	2720	6730	0.2	3330	2990
=36.00	13	6170	0.3	2670	2440	6840	0.3	3030	2690	6030	0.3	2590	2380	6640	0.3	2910	2620
	17	5980	0.4	2290	2090	6610	0.4	2590	2300	5840	0.4	2220	2040	6410	0.4	2490	2240
16-#14	21	5760	0.5	1910	1740	6340	0.5	2160	1920	5610	0.5	1850	1700	6140	0.5	2080	1870
4x-6y	25	5490	0.7	1140	1050	6010	0.7	1300	1150	5350	0.7	1110	1020	5820	0.7	1250	1120
	40	4290	0.9	381	348	4570	0.9	432	384	4140	0.9	369	339	4380	0.9	415	373
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1630	1250	9.60	8.40	1630	1250	9.60	8.40	1540	1180	9.60	8.40	1540	1180	9.60	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 28 x 32

Designation		W 14 x176								W 14 x159							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	$Pu/(\phi cPn)$	Mux	Muy	ϕcPn	$Pu/(\phi cPn)$	Mux	Muy	ϕcPn	$Pu/(\phi cPn)$	Mux	Muy	ϕcPn	$Pu/(\phi cPn)$	Mux	Muy
.54 %	0	5180	0.0	1780	1550	5800	0.0	2170	1850	5050	0.0	1680	1460	5600	0.0	2030	1750
Ar(in²)	11	5040	0.2	1610	1390	5620	0.2	1950	1670	4900	0.2	1520	1310	5430	0.2	1830	1580
= 4.80	13	4990	0.3	1410	1220	5550	0.3	1710	1460	4850	0.3	1330	1150	5360	0.3	1600	1380
	17	4850	0.4	1200	1050	5390	0.4	1470	1250	4710	0.4	1140	985	5200	0.4	1370	1180
8-# 7	21	4690	0.5	1000	870	5190	0.5	1220	1040	4550	0.5	946	821	4990	0.5	1140	985
4x-2y	25	4500	0.7	602	522	4950	0.7	732	625	4360	0.7	568	492	4760	0.7	685	591
	40	3610	0.9	200	174	3870	0.9	244	208	3470	0.9	189	164	3690	0.9	228	197
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1470	1130	9.60	8.40	1470	1130	9.60	8.40	1380	1060	9.60	8.40	1380	1060	9.60	8.40
1.00 %	0	5310	0.0	2020	1780	5930	0.0	2400	2080	5180	0.0	1910	1690	5730	0.0	2260	1980
Ar(in²)	11	5170	0.2	1810	1600	5750	0.2	2160	1870	5030	0.2	1720	1520	5550	0.2	2040	1780
= 9.00	13	5110	0.3	1590	1400	5680	0.3	1890	1640	4970	0.3	1510	1330	5480	0.3	1780	1560
	17	4970	0.4	1360	1200	5500	0.4	1620	1400	4830	0.4	1290	1140	5310	0.4	1530	1340
4-#14	21	4800	0.5	1130	998	5290	0.5	1350	1170	4660	0.5	1080	950	5100	0.5	1270	1110
2x-2y	25	4600	0.7	680	599	5040	0.7	810	701	4450	0.7	646	570	4850	0.7	763	667
	40	3660	0.9	226	199	3920	0.9	270	233	3520	0.9	215	190	3740	0.9	254	222
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1470	1130	9.60	8.40	1470	1130	9.60	8.40	1380	1060	9.60	8.40	1380	1060	9.60	8.40
2.01 %	0	5600	0.0	2540	2060	6210	0.0	2920	2360	5460	0.0	2430	1970	6020	0.0	2780	2260
Ar(in²)	11	5430	0.2	2280	1850	6010	0.2	2630	2120	5300	0.2	2190	1770	5820	0.2	2500	2030
=18.00	13	5370	0.3	2000	1620	5930	0.3	2300	1860	5230	0.3	1920	1550	5740	0.3	2190	1780
	17	5210	0.4	1710	1390	5740	0.4	1970	1590	5070	0.4	1640	1330	5550	0.4	1880	1520
8-#14	21	5020	0.5	1430	1160	5510	0.5	1640	1330	4880	0.5	1370	1110	5320	0.5	1560	1270
4x-2y	25	4800	0.7	855	693	5240	0.7	985	796	4660	0.7	821	664	5050	0.7	938	762
	40	3780	0.9	285	231	4020	0.9	328	265	3630	0.9	273	221	3830	0.9	312	254
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1460	1120	9.60	8.40	1460	1120	9.60	8.40	1370	1050	9.60	8.40	1370	1050	9.60	8.40
3.01 %	0	5880	0.0	2900	2500	6500	0.0	3280	2800	5750	0.0	2800	2410	6300	0.0	3140	2700
Ar(in²)	11	5700	0.2	2610	2250	6280	0.2	2950	2520	5560	0.2	2520	2170	6080	0.2	2830	2430
=27.00	13	5630	0.3	2280	1970	6190	0.3	2580	2200	5490	0.3	2200	1900	6000	0.3	2470	2120
	17	5460	0.4	1960	1680	5980	0.4	2220	1890	5320	0.4	1890	1630	5790	0.4	2120	1820
12-#14	21	5250	0.5	1630	1400	5730	0.5	1850	1570	5100	0.5	1570	1360	5530	0.5	1770	1520
4x-4y	25	5000	0.7	977	842	5430	0.7	1110	943	4850	0.7	943	813	5240	0.7	1060	910
	40	3880	0.9	325	280	4110	0.9	369	314	3730	0.9	314	271	3920	0.9	353	303
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1460	1120	9.60	8.40	1460	1120	9.60	8.40	1370	1050	9.60	8.40	1370	1050	9.60	8.40
4.02 %	0	6170	0.0	3180	2940	6780	0.0	3550	3230	6030	0.0	3080	2850	6590	0.0	3420	3130
Ar(in²)	11	5970	0.2	2860	2640	6540	0.2	3200	2910	5830	0.2	2770	2570	6340	0.2	3070	2820
=36.00	13	5890	0.3	2510	2310	6450	0.3	2800	2550	5750	0.3	2430	2250	6250	0.3	2690	2470
	17	5700	0.4	2150	1980	6220	0.4	2400	2180	5560	0.4	2080	1920	6020	0.4	2310	2120
16-#14	21	5470	0.5	1790	1650	5940	0.5	2000	1820	5320	0.5	1730	1600	5740	0.5	1920	1760
4x-6y	25	5200	0.7	1070	990	5620	0.7	1200	1090	5050	0.7	1040	962	5420	0.7	1150	1060
	40	3990	0.9	357	330	4200	0.9	399	363	3830	0.9	346	320	4010	0.9	384	352
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1450	1110	9.60	8.40	1450	1110	9.60	8.40	1360	1040	9.60	8.40	1360	1040	9.60	8.40

Notes : 1. Cex = $Pex(KxLx)^2/10000.$ (kip-ft²), Cey = $Pey(KyLy)^2/10000.$ (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = $\phi bMnx$ and Muy = $\phi bMny$ when $Pu/(\phi cPn)$ = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 32

Designation		W 14 x145								W 14 x132							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	4940	0.0	1600	1390	5450	0.0	1920	1670	4840	0.0	1520	1310	5300	0.0	1810	1570
Ar(in²)	11	4800	0.2	1440	1250	5270	0.2	1730	1500	4690	0.2	1370	1180	5130	0.2	1630	1410
= 4.80	13	4740	0.3	1260	1090	5210	0.3	1510	1310	4640	0.3	1200	1030	5060	0.3	1430	1240
	17	4610	0.4	1080	936	5040	0.4	1300	1120	4500	0.4	1030	885	4890	0.4	1220	1060
8-# 7	21	4440	0.5	901	780	4840	0.5	1080	936	4330	0.5	857	737	4690	0.5	1020	883
4x-2y	25	4250	0.7	540	468	4610	0.7	647	562	4140	0.7	514	442	4460	0.7	612	529
	40	3350	0.9	180	156	3550	0.9	215	187	3240	0.9	171	147	3420	0.9	204	176
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1310	1000	9.60	8.40	1310	1000	9.60	8.40	1240	951	9.60	8.40	1240	951	9.60	8.40
1.00 %	0	5070	0.0	1830	1610	5580	0.0	2150	1890	4970	0.0	1760	1540	5430	0.0	2050	1800
Ar(in²)	11	4920	0.2	1650	1450	5400	0.2	1940	1700	4820	0.2	1580	1390	5250	0.2	1840	1620
= 9.00	13	4860	0.3	1440	1270	5330	0.3	1690	1490	4760	0.3	1380	1210	5180	0.3	1610	1420
	17	4720	0.4	1240	1090	5160	0.4	1450	1280	4610	0.4	1190	1040	5010	0.4	1380	1210
4-#14	21	4540	0.5	1030	908	4950	0.5	1210	1060	4440	0.5	987	865	4800	0.5	1150	1010
2x-2y	25	4340	0.7	618	545	4700	0.7	725	638	4230	0.7	592	519	4550	0.7	690	606
	40	3400	0.9	206	181	3600	0.9	241	212	3290	0.9	197	173	3460	0.9	230	202
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1310	1000	9.60	8.40	1310	1000	9.60	8.40	1240	949	9.60	8.40	1240	949	9.60	8.40
2.01 %	0	5360	0.0	2350	1900	5870	0.0	2670	2170	5250	0.0	2280	1820	5720	0.0	2560	2080
Ar(in²)	11	5190	0.2	2120	1710	5660	0.2	2400	1960	5080	0.2	2050	1640	5510	0.2	2310	1870
=18.00	13	5120	0.3	1850	1490	5590	0.3	2100	1710	5020	0.3	1790	1430	5430	0.3	2020	1640
	17	4960	0.4	1590	1280	5390	0.4	1800	1470	4850	0.4	1540	1230	5240	0.4	1730	1400
8-#14	21	4770	0.5	1320	1070	5160	0.5	1500	1220	4660	0.5	1280	1020	5010	0.5	1440	1170
4x-2y	25	4540	0.7	793	639	4890	0.7	900	733	4430	0.7	768	614	4740	0.7	865	701
	40	3510	0.9	264	213	3690	0.9	300	244	3390	0.9	256	204	3550	0.9	288	233
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1300	997	9.60	8.40	1300	997	9.60	8.40	1230	945	9.60	8.40	1230	945	9.60	8.40
3.01 %	0	5640	0.0	2710	2340	6150	0.0	3030	2610	5540	0.0	2640	2260	6000	0.0	2930	2520
Ar(in²)	11	5450	0.2	2440	2100	5930	0.2	2730	2350	5350	0.2	2370	2040	5780	0.2	2630	2270
=27.00	13	5380	0.3	2140	1840	5840	0.3	2390	2060	5270	0.3	2080	1780	5690	0.3	2300	1980
	17	5200	0.4	1830	1580	5630	0.4	2050	1760	5090	0.4	1780	1530	5480	0.4	1970	1700
12-#14	21	4990	0.5	1530	1310	5380	0.5	1700	1470	4870	0.5	1480	1270	5220	0.5	1650	1420
4x-4y	25	4740	0.7	915	788	5080	0.7	1020	881	4620	0.7	890	763	4930	0.7	987	849
	40	3610	0.9	305	262	3780	0.9	340	293	3480	0.9	296	254	3630	0.9	329	283
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1300	993	9.60	8.40	1300	993	9.60	8.40	1230	940	9.60	8.40	1230	940	9.60	8.40
4.02 %	0	5930	0.0	3000	2780	6430	0.0	3310	3050	5820	0.0	2930	2700	6280	0.0	3200	2960
Ar(in²)	11	5720	0.2	2700	2500	6190	0.2	2980	2740	5610	0.2	2630	2430	6040	0.2	2880	2660
=36.00	13	5640	0.3	2360	2190	6100	0.3	2600	2400	5530	0.3	2300	2130	5940	0.3	2520	2330
	17	5440	0.4	2030	1880	5870	0.4	2230	2060	5330	0.4	1970	1830	5710	0.4	2160	2000
16-#14	21	5200	0.5	1690	1560	5590	0.5	1860	1720	5090	0.5	1650	1520	5430	0.5	1800	1660
4x-6y	25	4930	0.7	1010	937	5270	0.7	1120	1030	4810	0.7	987	912	5110	0.7	1080	997
	40	3700	0.9	337	312	3850	0.9	371	343	3570	0.9	329	304	3700	0.9	360	332
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1290	989	9.60	8.40	1290	989	9.60	8.40	1220	936	9.60	8.40	1220	936	9.60	8.40

Notes :
1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 32

Designation		W 12 x336								W 12 x305							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.54 %	0	6430	0.0	2720	2110	7600	0.0	3420	2470	6180	0.0	2520	2010	7250	0.0	3160	2350
Ar(in²)	11	6290	0.2	2450	1900	7410	0.2	3080	2220	6050	0.2	2270	1800	7060	0.2	2840	2110
= 4.80	13	6240	0.3	2140	1660	7340	0.3	2700	1950	5990	0.3	1990	1580	6990	0.3	2490	1850
	17	6100	0.4	1830	1420	7150	0.4	2310	1670	5860	0.4	1700	1350	6810	0.4	2130	1590
8-# 7	21	5940	0.5	1530	1190	6920	0.5	1930	1390	5700	0.5	1420	1130	6590	0.5	1780	1320
4x-2y	25	5750	0.7	917	711	6660	0.7	1160	834	5510	0.7	852	676	6330	0.7	1070	792
	40	4820	0.9	305	237	5410	0.9	385	278	4590	0.9	284	225	5120	0.9	355	264
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2300	1760	9.60	8.40	2300	1760	9.60	8.40	2140	1640	9.60	8.40	2140	1640	9.60	8.40
1.00 %	0	6560	0.0	2950	2330	7740	0.0	3650	2690	6320	0.0	2750	2230	7380	0.0	3390	2570
Ar(in²)	11	6420	0.2	2650	2100	7540	0.2	3290	2420	6170	0.2	2480	2010	7190	0.2	3050	2310
= 9.00	13	6360	0.3	2320	1840	7460	0.3	2880	2120	6120	0.3	2170	1760	7110	0.3	2670	2030
	17	6220	0.4	1990	1570	7270	0.4	2470	1820	5980	0.4	1860	1510	6920	0.4	2290	1740
4-#14	21	6050	0.5	1660	1310	7030	0.5	2060	1520	5810	0.5	1550	1250	6690	0.5	1910	1450
2x-2y	25	5850	0.7	995	786	6760	0.7	1230	909	5610	0.7	929	752	6430	0.7	1140	868
	40	4890	0.9	331	262	5470	0.9	411	303	4660	0.9	309	250	5180	0.9	381	289
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2300	1760	9.60	8.40	2300	1760	9.60	8.40	2140	1640	9.60	8.40	2140	1640	9.60	8.40
2.01 %	0	6850	0.0	3470	2600	8020	0.0	4170	2960	6600	0.0	3270	2500	7670	0.0	3910	2840
Ar(in²)	11	6690	0.2	3120	2340	7810	0.2	3750	2670	6440	0.2	2950	2250	7460	0.2	3510	2560
=18.00	13	6630	0.3	2730	2050	7720	0.3	3280	2330	6380	0.3	2580	1970	7370	0.3	3080	2240
	17	6480	0.4	2340	1760	7520	0.4	2820	2000	6230	0.4	2210	1690	7170	0.4	2640	1920
8-#14	21	6290	0.5	1950	1460	7260	0.5	2350	1670	6050	0.5	1840	1410	6920	0.5	2200	1600
4x-2y	25	6070	0.7	1170	878	6970	0.7	1410	1000	5830	0.7	1100	844	6640	0.7	1320	958
	40	5040	0.9	389	292	5600	0.9	469	333	4800	0.9	368	281	5300	0.9	439	319
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2300	1760	9.60	8.40	2300	1760	9.60	8.40	2130	1630	9.60	8.40	2130	1630	9.60	8.40
3.01 %	0	7130	0.0	3830	3030	8310	0.0	4530	3390	6890	0.0	3630	2940	7950	0.0	4270	3270
Ar(in²)	11	6960	0.2	3440	2730	8070	0.2	4080	3050	6710	0.2	3270	2640	7720	0.2	3840	2950
=27.00	13	6890	0.3	3010	2390	7980	0.3	3570	2670	6650	0.3	2860	2310	7640	0.3	3360	2580
	17	6730	0.4	2580	2050	7760	0.4	3060	2290	6480	0.4	2450	1980	7420	0.4	2880	2210
12-#14	21	6530	0.5	2150	1710	7490	0.5	2550	1910	6280	0.5	2040	1650	7150	0.5	2400	1840
4x-4y	25	6290	0.7	1290	1020	7180	0.7	1530	1150	6050	0.7	1230	990	6840	0.7	1440	1100
	40	5180	0.9	430	341	5720	0.9	509	381	4940	0.9	408	330	5410	0.9	480	368
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2290	1750	9.60	8.40	2290	1750	9.60	8.40	2130	1630	9.60	8.40	2130	1630	9.60	8.40
4.02 %	0	7410	0.0	4070	3470	8590	0.0	4770	3830	7170	0.0	3880	3370	8240	0.0	4510	3700
Ar(in²)	11	7230	0.2	3670	3120	8340	0.2	4290	3440	6980	0.2	3500	3030	7990	0.2	4060	3330
=36.00	13	7160	0.3	3210	2730	8250	0.3	3760	3010	6910	0.3	3060	2650	7900	0.3	3550	2920
	17	6980	0.4	2750	2340	8010	0.4	3220	2580	6730	0.4	2620	2270	7660	0.4	3050	2500
16-#14	21	6760	0.5	2290	1950	7720	0.5	2680	2150	6510	0.5	2180	1900	7380	0.5	2540	2080
4x-6y	25	6510	0.7	1380	1170	7390	0.7	1610	1290	6260	0.7	1310	1140	7050	0.7	1520	1250
	40	5310	0.9	458	390	5830	0.9	536	430	5060	0.9	436	379	5520	0.9	507	416
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2280	1750	9.60	8.40	2280	1750	9.60	8.40	2120	1620	9.60	8.40	2120	1620	9.60	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 32

Designation		W 12 x279								W 12 x252							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.54 %	0	5980	0.0	2360	1920	6950	0.0	2940	2240	5770	0.0	2200	1820	6650	0.0	2720	2130
Ar(in²)	11	5840	0.2	2130	1720	6770	0.2	2640	2020	5640	0.2	1980	1640	6470	0.2	2450	1920
= 4.80	13	5790	0.3	1860	1510	6700	0.3	2310	1770	5580	0.3	1740	1430	6400	0.3	2140	1680
	17	5660	0.4	1590	1290	6520	0.4	1980	1510	5450	0.4	1490	1230	6230	0.4	1830	1440
8-# 7	21	5490	0.5	1330	1080	6300	0.5	1650	1260	5290	0.5	1240	1020	6010	0.5	1530	1200
4x-2y	25	5300	0.7	797	646	6050	0.7	990	756	5100	0.7	743	614	5770	0.7	917	718
	40	4400	0.9	265	215	4870	0.9	330	252	4200	0.9	247	204	4610	0.9	305	239
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2010	1540	9.60	8.40	2010	1540	9.60	8.40	1870	1430	9.60	8.40	1870	1430	9.60	8.40
1.00 %	0	6110	0.0	2590	2140	7090	0.0	3170	2470	5910	0.0	2430	2050	6790	0.0	2950	2350
Ar(in²)	11	5970	0.2	2330	1930	6890	0.2	2850	2220	5760	0.2	2190	1840	6600	0.2	2650	2120
= 9.00	13	5910	0.3	2040	1690	6820	0.3	2490	1940	5710	0.3	1920	1610	6520	0.3	2320	1850
	17	5780	0.4	1750	1450	6640	0.4	2140	1660	5570	0.4	1640	1380	6340	0.4	1990	1590
4-#14	21	5610	0.5	1460	1200	6410	0.5	1780	1390	5400	0.5	1370	1150	6120	0.5	1660	1320
2x-2y	25	5410	0.7	875	722	6150	0.7	1070	832	5200	0.7	821	690	5860	0.7	994	794
	40	4460	0.9	291	240	4920	0.9	356	277	4260	0.9	273	230	4670	0.9	331	264
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2000	1530	9.60	8.40	2000	1530	9.60	8.40	1860	1430	9.60	8.40	1860	1430	9.60	8.40
2.01 %	0	6400	0.0	3110	2410	7370	0.0	3680	2740	6190	0.0	2950	2320	7070	0.0	3460	2630
Ar(in²)	11	6240	0.2	2800	2170	7160	0.2	3310	2460	6030	0.2	2660	2090	6870	0.2	3120	2360
=18.00	13	6180	0.3	2450	1900	7080	0.3	2900	2150	5970	0.3	2320	1830	6790	0.3	2730	2070
	17	6030	0.4	2100	1630	6880	0.4	2490	1850	5820	0.4	1990	1570	6590	0.4	2340	1770
8-#14	21	5840	0.5	1750	1360	6640	0.5	2070	1540	5630	0.5	1660	1300	6350	0.5	1950	1480
4x-2y	25	5620	0.7	1050	814	6350	0.7	1240	923	5410	0.7	996	782	6070	0.7	1170	885
	40	4600	0.9	349	271	5040	0.9	414	307	4390	0.9	332	260	4780	0.9	389	295
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2000	1530	9.60	8.40	2000	1530	9.60	8.40	1860	1420	9.60	8.40	1860	1420	9.60	8.40
3.01 %	0	6680	0.0	3470	2850	7660	0.0	4040	3170	6470	0.0	3310	2750	7360	0.0	3830	3060
Ar(in²)	11	6510	0.2	3120	2560	7430	0.2	3640	2850	6300	0.2	2980	2480	7130	0.2	3440	2750
=27.00	13	6440	0.3	2730	2240	7340	0.3	3180	2490	6230	0.3	2610	2170	7050	0.3	3010	2410
	17	6280	0.4	2340	1920	7130	0.4	2730	2140	6070	0.4	2240	1860	6830	0.4	2580	2060
12-#14	21	6070	0.5	1950	1600	6870	0.5	2270	1780	5860	0.5	1860	1550	6570	0.5	2150	1720
4x-4y	25	5840	0.7	1170	961	6560	0.7	1360	1070	5630	0.7	1120	929	6270	0.7	1290	1030
	40	4730	0.9	390	320	5150	0.9	454	356	4520	0.9	372	309	4890	0.9	430	343
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1990	1520	9.60	8.40	1990	1520	9.60	8.40	1850	1420	9.60	8.40	1850	1420	9.60	8.40
4.02 %	0	6970	0.0	3720	3280	7940	0.0	4290	3600	6760	0.0	3570	3190	7640	0.0	4070	3490
Ar(in²)	11	6780	0.2	3350	2950	7700	0.2	3860	3240	6570	0.2	3210	2870	7400	0.2	3660	3140
=36.00	13	6710	0.3	2930	2590	7600	0.3	3380	2830	6500	0.3	2810	2510	7310	0.3	3210	2750
	17	6530	0.4	2510	2220	7370	0.4	2890	2430	6310	0.4	2410	2150	7080	0.4	2750	2360
16-#14	21	6310	0.5	2090	1850	7090	0.5	2410	2020	6090	0.5	2010	1790	6800	0.5	2290	1960
4x-6y	25	6050	0.7	1260	1110	6760	0.7	1450	1210	5830	0.7	1200	1080	6470	0.7	1370	1180
	40	4860	0.9	418	369	5260	0.9	482	404	4640	0.9	401	358	4990	0.9	458	392
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1990	1520	9.60	8.40	1990	1520	9.60	8.40	1850	1410	9.60	8.40	1850	1410	9.60	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 8.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 28 x 32

Designation		W 12 x230								W 12 x210							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.54 %	0	5600	0.0	2080	1740	6410	0.0	2540	2040	5450	0.0	1960	1660	6180	0.0	2390	1950
Ar(in²)	11	5470	0.2	1870	1570	6230	0.2	2290	1830	5310	0.2	1770	1490	6000	0.2	2150	1750
= 4.80	13	5410	0.3	1640	1370	6160	0.3	2000	1600	5250	0.3	1540	1310	5940	0.3	1880	1530
	17	5280	0.4	1400	1170	5990	0.4	1720	1370	5120	0.4	1320	1120	5770	0.4	1610	1310
8-# 7	21	5120	0.5	1170	978	5780	0.5	1430	1150	4960	0.5	1100	934	5560	0.5	1340	1090
4x-2y	25	4930	0.7	701	587	5530	0.7	858	687	4770	0.7	662	560	5320	0.7	805	656
	40	4030	0.9	233	195	4400	0.9	286	229	3880	0.9	220	186	4200	0.9	268	218
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1750	1340	9.60	8.40	1750	1340	9.60	8.40	1650	1260	9.60	8.40	1650	1260	9.60	8.40
1.00 %	0	5740	0.0	2310	1970	6540	0.0	2780	2260	5580	0.0	2190	1890	6310	0.0	2620	2170
Ar(in²)	11	5590	0.2	2080	1770	6350	0.2	2500	2040	5430	0.2	1970	1700	6130	0.2	2360	1950
= 9.00	13	5540	0.3	1820	1550	6280	0.3	2190	1780	5380	0.3	1730	1490	6060	0.3	2060	1710
	17	5400	0.4	1560	1330	6100	0.4	1870	1530	5240	0.4	1480	1270	5880	0.4	1770	1470
4-#14	21	5230	0.5	1300	1110	5880	0.5	1560	1270	5070	0.5	1230	1060	5660	0.5	1470	1220
2x-2y	25	5030	0.7	778	663	5630	0.7	936	763	4870	0.7	739	637	5410	0.7	883	732
	40	4090	0.9	259	221	4450	0.9	312	254	3940	0.9	246	212	4260	0.9	294	244
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1750	1340	9.60	8.40	1750	1340	9.60	8.40	1650	1260	9.60	8.40	1650	1260	9.60	8.40
2.01 %	0	6020	0.0	2830	2250	6830	0.0	3290	2530	5860	0.0	2710	2170	6600	0.0	3130	2440
Ar(in²)	11	5860	0.2	2540	2020	6620	0.2	2960	2280	5700	0.2	2440	1950	6400	0.2	2820	2200
=18.00	13	5800	0.3	2230	1770	6540	0.3	2590	2000	5640	0.3	2130	1710	6320	0.3	2470	1920
	17	5650	0.4	1910	1520	6350	0.4	2220	1710	5490	0.4	1830	1460	6120	0.4	2120	1650
8-#14	21	5460	0.5	1590	1260	6110	0.5	1850	1430	5300	0.5	1520	1220	5890	0.5	1760	1370
4x-2y	25	5240	0.7	953	758	5830	0.7	1110	855	5080	0.7	914	731	5610	0.7	1060	824
	40	4220	0.9	317	252	4560	0.9	370	285	4060	0.9	304	243	4360	0.9	352	274
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1750	1340	9.60	8.40	1750	1340	9.60	8.40	1640	1260	9.60	8.40	1640	1260	9.60	8.40
3.01 %	0	6300	0.0	3190	2680	7110	0.0	3650	2970	6150	0.0	3070	2600	6880	0.0	3500	2880
Ar(in²)	11	6130	0.2	2870	2410	6890	0.2	3290	2670	5970	0.2	2760	2340	6660	0.2	3150	2590
=27.00	13	6060	0.3	2510	2110	6800	0.3	2880	2340	5900	0.3	2420	2050	6580	0.3	2750	2270
	17	5890	0.4	2150	1810	6590	0.4	2470	2000	5730	0.4	2070	1760	6370	0.4	2360	1940
12-#14	21	5690	0.5	1790	1510	6330	0.5	2050	1670	5530	0.5	1730	1470	6110	0.5	1970	1620
4x-4y	25	5450	0.7	1080	905	6030	0.7	1230	1000	5290	0.7	1040	879	5810	0.7	1180	971
	40	4340	0.9	358	301	4670	0.9	410	333	4180	0.9	345	293	4460	0.9	393	323
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1740	1330	9.60	8.40	1740	1330	9.60	8.40	1640	1250	9.60	8.40	1640	1250	9.60	8.40
4.02 %	0	6590	0.0	3440	3120	7400	0.0	3900	3400	6430	0.0	3330	3040	7170	0.0	3740	3310
Ar(in²)	11	6400	0.2	3100	2810	7150	0.2	3510	3060	6240	0.2	3000	2740	6930	0.2	3360	2980
=36.00	13	6320	0.3	2710	2460	7060	0.3	3070	2680	6160	0.3	2620	2400	6830	0.3	2940	2610
	17	6140	0.4	2320	2100	6830	0.4	2630	2290	5980	0.4	2250	2050	6610	0.4	2520	2240
16-#14	21	5920	0.5	1940	1750	6550	0.5	2190	1910	5750	0.5	1870	1710	6330	0.5	2100	1860
4x-6y	25	5660	0.7	1160	1050	6230	0.7	1310	1150	5490	0.7	1120	1030	6010	0.7	1260	1120
	40	4460	0.9	387	350	4770	0.9	438	382	4290	0.9	374	342	4560	0.9	420	372
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1730	1330	9.60	8.40	1730	1330	9.60	8.40	1630	1250	9.60	8.40	1630	1250	9.60	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85   f'c : 8.0 ksi NW
φb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 28 x 32

Designation		W 12 x190								W 12 x170							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	5290	0.0	1850	1580	5950	0.0	2230	1850	5130	0.0	1740	1490	5730	0.0	2080	1750
Ar(in²)	11	5150	0.2	1660	1420	5780	0.2	2010	1670	4990	0.2	1560	1340	5550	0.2	1870	1580
= 4.80	13	5090	0.3	1460	1240	5710	0.3	1760	1460	4940	0.3	1370	1180	5490	0.3	1640	1380
	17	4960	0.4	1250	1070	5540	0.4	1510	1250	4800	0.4	1170	1010	5320	0.4	1400	1180
8-# 7	21	4800	0.5	1040	888	5330	0.5	1250	1040	4640	0.5	977	839	5120	0.5	1170	985
4x-2y	25	4610	0.7	623	532	5100	0.7	752	624	4450	0.7	586	503	4880	0.7	701	591
	40	3720	0.9	207	177	4000	0.9	250	208	3560	0.9	195	167	3800	0.9	233	197
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1540	1180	9.60	8.40	1540	1180	9.60	8.40	1440	1100	9.60	8.40	1440	1100	9.60	8.40
1.00 %	0	5420	0.0	2080	1810	6080	0.0	2460	2080	5270	0.0	1970	1720	5860	0.0	2310	1980
Ar(in²)	11	5270	0.2	1870	1620	5900	0.2	2210	1870	5120	0.2	1770	1550	5680	0.2	2080	1780
= 9.00	13	5220	0.3	1640	1420	5830	0.3	1940	1630	5060	0.3	1550	1350	5610	0.3	1820	1560
	17	5080	0.4	1400	1220	5650	0.4	1660	1400	4920	0.4	1330	1160	5430	0.4	1560	1340
4-#14	21	4910	0.5	1170	1020	5440	0.5	1380	1170	4750	0.5	1110	967	5220	0.5	1300	1110
2x-2y	25	4710	0.7	701	609	5190	0.7	830	700	4550	0.7	664	580	4980	0.7	779	667
	40	3770	0.9	233	203	4050	0.9	276	233	3610	0.9	221	193	3850	0.9	259	222
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1540	1180	9.60	8.40	1540	1180	9.60	8.40	1440	1100	9.60	8.40	1440	1100	9.60	8.40
2.01 %	0	5700	0.0	2600	2090	6370	0.0	2980	2350	5550	0.0	2490	2000	6150	0.0	2830	2250
Ar(in²)	11	5540	0.2	2340	1880	6170	0.2	2680	2110	5390	0.2	2240	1800	5940	0.2	2540	2030
=18.00	13	5480	0.3	2040	1640	6090	0.3	2350	1850	5320	0.3	1960	1580	5870	0.3	2230	1770
	17	5320	0.4	1750	1410	5900	0.4	2010	1590	5170	0.4	1680	1350	5670	0.4	1910	1520
8-#14	21	5130	0.5	1460	1170	5660	0.5	1680	1320	4970	0.5	1400	1130	5440	0.5	1590	1270
4x-2y	25	4910	0.7	876	703	5390	0.7	1010	792	4750	0.7	838	675	5170	0.7	954	760
	40	3890	0.9	292	234	4160	0.9	335	264	3730	0.9	279	225	3950	0.9	318	253
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1540	1180	9.60	8.40	1540	1180	9.60	8.40	1430	1100	9.60	8.40	1430	1100	9.60	8.40
3.01 %	0	5990	0.0	2960	2520	6650	0.0	3340	2780	5840	0.0	2850	2440	6430	0.0	3190	2690
Ar(in²)	11	5810	0.2	2660	2270	6430	0.2	3010	2510	5650	0.2	2560	2200	6210	0.2	2870	2420
=27.00	13	5740	0.3	2330	1990	6350	0.3	2630	2190	5580	0.3	2240	1920	6120	0.3	2510	2120
	17	5570	0.4	2000	1700	6140	0.4	2250	1880	5410	0.4	1920	1650	5910	0.4	2150	1810
12-#14	21	5360	0.5	1660	1420	5880	0.5	1880	1570	5200	0.5	1600	1370	5660	0.5	1790	1510
4x-4y	25	5120	0.7	998	851	5590	0.7	1130	939	4950	0.7	960	823	5360	0.7	1080	907
	40	4000	0.9	332	283	4250	0.9	375	313	3830	0.9	320	274	4040	0.9	358	302
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1530	1170	9.60	8.40	1530	1170	9.60	8.40	1430	1090	9.60	8.40	1430	1090	9.60	8.40
4.02 %	0	6270	0.0	3220	2960	6940	0.0	3580	3220	6120	0.0	3110	2880	6720	0.0	3430	3120
Ar(in²)	11	6080	0.2	2900	2670	6700	0.2	3230	2900	5920	0.2	2800	2590	6470	0.2	3090	2810
=36.00	13	6000	0.3	2530	2330	6600	0.3	2820	2530	5840	0.3	2450	2270	6380	0.3	2700	2460
	17	5810	0.4	2170	2000	6370	0.4	2420	2170	5650	0.4	2100	1940	6150	0.4	2320	2110
16-#14	21	5580	0.5	1810	1670	6100	0.5	2020	1810	5420	0.5	1750	1620	5870	0.5	1930	1760
4x-6y	25	5320	0.7	1090	999	5780	0.7	1210	1090	5150	0.7	1050	971	5550	0.7	1160	1050
	40	4110	0.9	361	333	4340	0.9	403	362	3930	0.9	349	323	4130	0.9	386	351
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1520	1170	9.60	8.40	1520	1170	9.60	8.40	1420	1090	9.60	8.40	1420	1090	9.60	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 28 x 32

Designation		W 12 x152								W 12 x136							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	4990	0.0	1640	1410	5520	0.0	1940	1660	4870	0.0	1550	1330	5340	0.0	1820	1570
Ar(in²)	11	4850	0.2	1480	1270	5350	0.2	1750	1490	4720	0.2	1400	1200	5170	0.2	1640	1410
= 4.80	13	4800	0.3	1290	1110	5280	0.3	1530	1310	4670	0.3	1220	1050	5100	0.3	1440	1240
	17	4660	0.4	1110	952	5120	0.4	1310	1120	4530	0.4	1050	898	4940	0.4	1230	1060
8-# 7	21	4490	0.5	922	793	4920	0.5	1090	933	4360	0.5	872	748	4740	0.5	1030	882
4x-2y	25	4300	0.7	553	476	4690	0.7	656	560	4170	0.7	523	449	4510	0.7	615	529
	40	3410	0.9	184	158	3620	0.9	218	186	3270	0.9	174	149	3460	0.9	205	176
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1350	1030	9.60	8.40	1350	1030	9.60	8.40	1260	966	9.60	8.40	1260	966	9.60	8.40
1.00 %	0	5130	0.0	1870	1640	5660	0.0	2180	1890	5000	0.0	1780	1560	5470	0.0	2060	1800
Ar(in²)	11	4980	0.2	1680	1470	5480	0.2	1960	1700	4850	0.2	1600	1400	5290	0.2	1850	1620
= 9.00	13	4920	0.3	1470	1290	5400	0.3	1710	1480	4790	0.3	1400	1230	5220	0.3	1620	1410
	17	4780	0.4	1260	1110	5230	0.4	1470	1270	4640	0.4	1200	1050	5050	0.4	1390	1210
4-#14	21	4600	0.5	1050	921	5020	0.5	1220	1060	4470	0.5	1000	876	4840	0.5	1160	1010
2x-2y	25	4400	0.7	631	552	4780	0.7	734	636	4260	0.7	601	526	4600	0.7	693	606
	40	3460	0.9	210	184	3670	0.9	244	212	3320	0.9	200	175	3500	0.9	231	202
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1340	1030	9.60	8.40	1340	1030	9.60	8.40	1260	964	9.60	8.40	1260	964	9.60	8.40
2.01 %	0	5410	0.0	2390	1920	5940	0.0	2690	2170	5280	0.0	2300	1840	5760	0.0	2570	2080
Ar(in²)	11	5240	0.2	2150	1730	5740	0.2	2420	1950	5110	0.2	2070	1660	5560	0.2	2310	1870
=18.00	13	5180	0.3	1880	1510	5660	0.3	2120	1710	5050	0.3	1810	1450	5480	0.3	2030	1630
	17	5020	0.4	1610	1300	5470	0.4	1820	1460	4890	0.4	1550	1240	5290	0.4	1740	1400
8-#14	21	4820	0.5	1340	1080	5240	0.5	1510	1220	4690	0.5	1290	1030	5050	0.5	1450	1170
4x-2y	25	4600	0.7	806	647	4970	0.7	908	730	4460	0.7	776	620	4790	0.7	867	700
	40	3570	0.9	268	215	3760	0.9	302	243	3420	0.9	258	206	3590	0.9	289	233
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1340	1020	9.60	8.40	1340	1020	9.60	8.40	1250	959	9.60	8.40	1250	959	9.60	8.40
3.01 %	0	5690	0.0	2750	2360	6230	0.0	3050	2600	5570	0.0	2660	2280	6040	0.0	2930	2510
Ar(in²)	11	5510	0.2	2470	2120	6000	0.2	2750	2340	5380	0.2	2400	2050	5820	0.2	2640	2260
=27.00	13	5440	0.3	2170	1860	5920	0.3	2400	2050	5300	0.3	2100	1800	5730	0.3	2310	1980
	17	5260	0.4	1860	1590	5710	0.4	2060	1760	5120	0.4	1800	1540	5520	0.4	1980	1700
12-#14	21	5050	0.5	1550	1330	5450	0.5	1720	1460	4910	0.5	1500	1280	5270	0.5	1650	1410
4x-4y	25	4800	0.7	928	796	5160	0.7	1030	878	4650	0.7	898	769	4970	0.7	989	848
	40	3670	0.9	309	265	3850	0.9	343	292	3520	0.9	299	256	3670	0.9	329	282
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1330	1020	9.60	8.40	1330	1020	9.60	8.40	1250	955	9.60	8.40	1250	955	9.60	8.40
4.02 %	0	5980	0.0	3010	2800	6510	0.0	3300	3040	5850	0.0	2930	2720	6330	0.0	3180	2950
Ar(in²)	11	5770	0.2	2710	2520	6270	0.2	2970	2740	5640	0.2	2630	2450	6080	0.2	2860	2660
=36.00	13	5690	0.3	2370	2200	6170	0.3	2600	2390	5560	0.3	2300	2140	5990	0.3	2510	2320
	17	5500	0.4	2030	1890	5940	0.4	2230	2050	5360	0.4	1980	1840	5760	0.4	2150	1990
16-#14	21	5260	0.5	1690	1570	5670	0.5	1860	1710	5120	0.5	1650	1530	5480	0.5	1790	1660
4x-6y	25	4990	0.7	1020	944	5350	0.7	1110	1030	4840	0.7	987	918	5160	0.7	1070	996
	40	3760	0.9	338	314	3930	0.9	371	341	3600	0.9	329	306	3750	0.9	358	332
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1330	1020	9.60	8.40	1330	1020	9.60	8.40	1240	951	9.60	8.40	1240	951	9.60	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 32

Designation		W 14 x426								W 14 x398							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.52 %	0	6570	0.0	3280	2180	8060	0.0	4280	2670	6360	0.0	3080	2090	7760	0.0	4010	2550
Ar(in²)	11	6410	0.2	2950	1970	7810	0.2	3850	2400	6200	0.2	2780	1880	7510	0.2	3610	2300
= 4.00	13	6340	0.3	2580	1720	7710	0.3	3370	2100	6130	0.3	2430	1650	7410	0.3	3160	2010
	17	6180	0.4	2210	1470	7470	0.4	2890	1800	5970	0.4	2080	1410	7180	0.4	2710	1720
4-# 9	21	5980	0.5	1840	1230	7180	0.5	2410	1500	5780	0.5	1730	1180	6890	0.5	2260	1440
2x-2y	25	5750	0.7	1110	737	6840	0.7	1450	901	5550	0.7	1040	705	6560	0.7	1350	861
	40	4670	0.9	368	245	5300	0.9	481	300	4480	0.9	346	235	5060	0.9	451	287
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2690	1510	9.60	7.20	2690	1510	9.60	7.20	2550	1430	9.60	7.20	2550	1430	9.60	7.20
1.04 %	0	6700	0.0	3520	2280	8190	0.0	4520	2770	6490	0.0	3320	2190	7880	0.0	4250	2650
Ar(in²)	11	6530	0.2	3160	2050	7930	0.2	4070	2490	6320	0.2	2990	1970	7630	0.2	3820	2380
= 8.00	13	6460	0.3	2770	1800	7830	0.3	3560	2180	6250	0.3	2620	1720	7530	0.3	3350	2090
	17	6290	0.4	2370	1540	7580	0.4	3050	1870	6080	0.4	2240	1480	7290	0.4	2870	1790
8-# 9	21	6090	0.5	1980	1280	7280	0.5	2540	1560	5880	0.5	1870	1230	6990	0.5	2390	1490
4x-2y	25	5850	0.7	1190	769	6930	0.7	1530	933	5640	0.7	1120	738	6650	0.7	1430	893
	40	4720	0.9	395	256	5340	0.9	508	311	4540	0.9	373	246	5110	0.9	477	297
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2690	1510	9.60	7.20	2690	1510	9.60	7.20	2540	1430	9.60	7.20	2540	1430	9.60	7.20
2.08 %	0	6950	0.0	3940	2630	8440	0.0	4950	3110	6740	0.0	3750	2540	8130	0.0	4680	3000
Ar(in²)	11	6770	0.2	3550	2370	8160	0.2	4450	2800	6560	0.2	3370	2280	7860	0.2	4210	2700
=16.00	13	6690	0.3	3110	2070	8060	0.3	3890	2450	6480	0.3	2950	2000	7760	0.3	3680	2360
	17	6510	0.4	2660	1780	7800	0.4	3340	2100	6300	0.4	2530	1710	7500	0.4	3160	2020
4-#18	21	6290	0.5	2220	1480	7480	0.5	2780	1750	6090	0.5	2110	1430	7190	0.5	2630	1690
2x-2y	25	6030	0.7	1330	887	7110	0.7	1670	1050	5830	0.7	1270	856	6830	0.7	1580	1010
	40	4840	0.9	443	295	5430	0.9	556	350	4650	0.9	421	285	5190	0.9	526	337
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		2680	1510	9.60	7.20	2680	1510	9.60	7.20	2540	1430	9.60	7.20	2540	1430	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 32

Designation		W 14 x370								W 14 x342							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.52 %	0	6150	0.0	2890	2000	7450	0.0	3750	2440	5940	0.0	2710	1900	7140	0.0	3480	2320
Ar(in²)	11	5990	0.2	2610	1800	7210	0.2	3370	2190	5780	0.2	2440	1710	6910	0.2	3140	2080
= 4.00	13	5920	0.3	2280	1570	7110	0.3	2950	1920	5710	0.3	2130	1500	6810	0.3	2740	1820
	17	5770	0.4	1950	1350	6890	0.4	2530	1640	5560	0.4	1830	1290	6590	0.4	2350	1560
4-# 9	21	5570	0.5	1630	1120	6610	0.5	2110	1370	5370	0.5	1520	1070	6320	0.5	1960	1300
2x-2y	25	5350	0.7	976	674	6290	0.7	1260	822	5140	0.7	913	642	6010	0.7	1180	781
	40	4300	0.9	325	224	4830	0.9	421	274	4110	0.9	304	214	4590	0.9	391	260
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2410	1350	9.60	7.20	2410	1350	9.60	7.20	2260	1270	9.60	7.20	2260	1270	9.60	7.20
1.04 %	0	6280	0.0	3130	2100	7570	0.0	3980	2530	6060	0.0	2940	2000	7270	0.0	3720	2410
Ar(in²)	11	6110	0.2	2820	1890	7330	0.2	3580	2280	5900	0.2	2650	1800	7020	0.2	3350	2170
= 8.00	13	6040	0.3	2470	1650	7230	0.3	3140	1990	5830	0.3	2320	1580	6930	0.3	2930	1900
	17	5880	0.4	2110	1420	6990	0.4	2690	1710	5670	0.4	1990	1350	6700	0.4	2510	1630
8-# 9	21	5670	0.5	1760	1180	6710	0.5	2240	1420	5470	0.5	1660	1130	6420	0.5	2090	1360
4x-2y	25	5440	0.7	1060	707	6370	0.7	1340	854	5240	0.7	993	675	6100	0.7	1260	814
	40	4350	0.9	352	235	4870	0.9	448	284	4170	0.9	331	225	4630	0.9	418	271
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2400	1350	9.60	7.20	2400	1350	9.60	7.20	2260	1270	9.60	7.20	2260	1270	9.60	7.20
2.08 %	0	6530	0.0	3560	2450	7830	0.0	4410	2880	6320	0.0	3370	2350	7520	0.0	4150	2760
Ar(in²)	11	6340	0.2	3200	2200	7560	0.2	3970	2590	6130	0.2	3030	2120	7260	0.2	3730	2490
=16.00	13	6270	0.3	2800	1930	7460	0.3	3470	2270	6060	0.3	2660	1850	7160	0.3	3270	2170
	17	6100	0.4	2400	1650	7210	0.4	2980	1940	5890	0.4	2280	1590	6910	0.4	2800	1860
4-#18	21	5880	0.5	2000	1380	6900	0.5	2480	1620	5670	0.5	1900	1320	6610	0.5	2330	1550
2x-2y	25	5630	0.7	1200	825	6550	0.7	1490	971	5420	0.7	1140	794	6270	0.7	1400	931
	40	4460	0.9	400	275	4950	0.9	496	323	4270	0.9	379	264	4710	0.9	466	310
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		2400	1350	9.60	7.20	2400	1350	9.60	7.20	2260	1270	9.60	7.20	2260	1270	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 32

Designation		W 14 x311								W 14 x283							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.52 %	0	5680	0.0	2500	1800	6770	0.0	3200	2180	5470	0.0	2320	1700	6460	0.0	2960	2060
Ar(in²)	11	5520	0.2	2250	1620	6540	0.2	2880	1960	5310	0.2	2090	1530	6240	0.2	2660	1850
= 4.00	13	5460	0.3	1970	1420	6460	0.3	2520	1720	5250	0.3	1830	1340	6150	0.3	2330	1620
	17	5310	0.4	1690	1210	6240	0.4	2160	1470	5090	0.4	1570	1150	5940	0.4	2000	1390
4-# 9	21	5120	0.5	1410	1010	5980	0.5	1800	1230	4910	0.5	1310	955	5680	0.5	1660	1160
2x-2y	25	4900	0.7	844	606	5670	0.7	1080	736	4690	0.7	784	573	5390	0.7	997	694
	40	3890	0.9	281	202	4300	0.9	360	245	3690	0.9	261	191	4060	0.9	332	231
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2090	1180	9.60	7.20	2090	1180	9.60	7.20	1950	1100	9.60	7.20	1950	1100	9.60	7.20
1.04 %	0	5810	0.0	2740	1900	6900	0.0	3440	2280	5600	0.0	2560	1800	6590	0.0	3190	2160
Ar(in²)	11	5640	0.2	2470	1710	6660	0.2	3100	2050	5430	0.2	2310	1620	6360	0.2	2870	1940
= 8.00	13	5580	0.3	2160	1490	6570	0.3	2710	1790	5360	0.3	2020	1420	6270	0.3	2510	1700
	17	5420	0.4	1850	1280	6350	0.4	2320	1540	5200	0.4	1730	1220	6050	0.4	2160	1460
8-# 9	21	5220	0.5	1540	1070	6070	0.5	1940	1280	5010	0.5	1440	1010	5780	0.5	1800	1210
4x-2y	25	4990	0.7	925	639	5760	0.7	1160	768	4780	0.7	864	607	5470	0.7	1080	727
	40	3940	0.9	308	213	4350	0.9	387	256	3740	0.9	288	202	4100	0.9	359	242
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2090	1180	9.60	7.20	2090	1180	9.60	7.20	1950	1100	9.60	7.20	1950	1100	9.60	7.20
2.08 %	0	6060	0.0	3170	2250	7150	0.0	3870	2630	5850	0.0	2990	2150	6840	0.0	3620	2510
Ar(in²)	11	5880	0.2	2850	2020	6900	0.2	3480	2370	5660	0.2	2690	1930	6590	0.2	3260	2250
=16.00	13	5810	0.3	2500	1770	6800	0.3	3050	2070	5590	0.3	2350	1690	6490	0.3	2850	1970
	17	5630	0.4	2140	1520	6560	0.4	2610	1770	5420	0.4	2020	1450	6260	0.4	2440	1690
4-#18	21	5420	0.5	1780	1260	6260	0.5	2180	1480	5210	0.5	1680	1210	5970	0.5	2040	1410
2x-2y	25	5170	0.7	1070	758	5930	0.7	1310	886	4960	0.7	1010	725	5640	0.7	1220	845
	40	4040	0.9	356	252	4420	0.9	435	295	3840	0.9	336	241	4180	0.9	407	281
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		2090	1170	9.60	7.20	2090	1170	9.60	7.20	1940	1090	9.60	7.20	1940	1090	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 8.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 24 x 32

Designation		W 14 x257								W 14 x233							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.52 %	0	5260	0.0	2160	1600	6160	0.0	2730	1940	5080	0.0	2010	1510	5890	0.0	2520	1830
Ar(in²)	11	5110	0.2	1940	1440	5950	0.2	2460	1750	4920	0.2	1810	1360	5680	0.2	2270	1650
= 4.00	13	5040	0.3	1700	1260	5860	0.3	2150	1530	4860	0.3	1580	1190	5600	0.3	1980	1440
	17	4890	0.4	1460	1080	5660	0.4	1840	1310	4700	0.4	1360	1020	5390	0.4	1700	1230
4-# 9	21	4710	0.5	1210	902	5410	0.5	1530	1090	4520	0.5	1130	851	5150	0.5	1420	1030
2x-2y	25	4490	0.7	728	541	5120	0.7	920	655	4310	0.7	677	510	4870	0.7	850	617
	40	3510	0.9	242	180	3830	0.9	306	218	3330	0.9	225	170	3610	0.9	283	205
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1810	1020	9.60	7.20	1810	1020	9.60	7.20	1690	949	9.60	7.20	1690	949	9.60	7.20
1.04 %	0	5390	0.0	2400	1710	6290	0.0	2970	2040	5200	0.0	2250	1610	6020	0.0	2760	1930
Ar(in²)	11	5220	0.2	2160	1530	6060	0.2	2670	1830	5040	0.2	2020	1450	5790	0.2	2480	1730
= 8.00	13	5160	0.3	1890	1340	5980	0.3	2340	1600	4970	0.3	1770	1270	5710	0.3	2170	1520
	17	5000	0.4	1620	1150	5760	0.4	2000	1380	4810	0.4	1520	1090	5500	0.4	1860	1300
8-# 9	21	4810	0.5	1350	959	5500	0.5	1670	1150	4620	0.5	1260	907	5240	0.5	1550	1080
4x-2y	25	4580	0.7	808	575	5200	0.7	1000	687	4390	0.7	757	544	4950	0.7	930	650
	40	3550	0.9	269	191	3870	0.9	333	229	3380	0.9	252	181	3650	0.9	310	216
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1810	1020	9.60	7.20	1810	1020	9.60	7.20	1690	948	9.60	7.20	1690	948	9.60	7.20
2.08 %	0	5640	0.0	2820	2060	6540	0.0	3390	2390	5460	0.0	2670	1960	6270	0.0	3180	2280
Ar(in²)	11	5460	0.2	2540	1850	6300	0.2	3050	2150	5270	0.2	2410	1770	6030	0.2	2870	2050
=16.00	13	5390	0.3	2220	1620	6200	0.3	2670	1880	5200	0.3	2110	1550	5930	0.3	2510	1790
	17	5220	0.4	1910	1390	5970	0.4	2290	1610	5030	0.4	1800	1330	5710	0.4	2150	1540
4-#18	21	5000	0.5	1590	1160	5690	0.5	1910	1340	4810	0.5	1500	1110	5430	0.5	1790	1280
2x-2y	25	4760	0.7	953	693	5370	0.7	1150	806	4570	0.7	902	663	5110	0.7	1070	768
	40	3640	0.9	317	231	3940	0.9	381	268	3460	0.9	300	221	3720	0.9	358	256
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1810	1020	9.60	7.20	1810	1020	9.60	7.20	1680	945	9.60	7.20	1680	945	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 32

Designation		W 14 x211								W 14 x193							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.52 %	0	4900	0.0	1870	1430	5640	0.0	2330	1720	4770	0.0	1770	1350	5440	0.0	2190	1640
Ar(in²)	11	4740	0.2	1690	1280	5430	0.2	2100	1550	4610	0.2	1590	1220	5230	0.2	1970	1470
= 4.00	13	4680	0.3	1470	1120	5350	0.3	1840	1360	4540	0.3	1390	1070	5150	0.3	1720	1290
	17	4530	0.4	1260	962	5150	0.4	1570	1160	4390	0.4	1190	914	4960	0.4	1480	1100
4-# 9	21	4350	0.5	1050	802	4910	0.5	1310	968	4210	0.5	993	761	4720	0.5	1230	920
2x-2y	25	4140	0.7	632	481	4640	0.7	787	581	4000	0.7	596	457	4450	0.7	737	552
	40	3170	0.9	210	160	3410	0.9	262	193	3040	0.9	198	152	3250	0.9	245	184
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1570	885	9.60	7.20	1570	885	9.60	7.20	1480	833	9.60	7.20	1480	833	9.60	7.20
1.04 %	0	5030	0.0	2110	1530	5770	0.0	2570	1820	4890	0.0	2000	1460	5570	0.0	2420	1740
Ar(in²)	11	4860	0.2	1900	1370	5550	0.2	2310	1640	4720	0.2	1800	1310	5350	0.2	2180	1560
= 8.00	13	4800	0.3	1660	1200	5460	0.3	2020	1440	4660	0.3	1580	1150	5270	0.3	1910	1370
	17	4640	0.4	1420	1030	5260	0.4	1730	1230	4500	0.4	1350	982	5060	0.4	1640	1170
8-# 9	21	4450	0.5	1190	858	5010	0.5	1450	1030	4310	0.5	1130	818	4820	0.5	1360	977
4x-2y	25	4220	0.7	712	515	4720	0.7	867	615	4080	0.7	676	491	4530	0.7	817	586
	40	3210	0.9	237	171	3450	0.9	289	205	3080	0.9	225	163	3290	0.9	272	195
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1570	883	9.60	7.20	1570	883	9.60	7.20	1480	832	9.60	7.20	1480	832	9.60	7.20
2.08 %	0	5280	0.0	2540	1880	6020	0.0	3000	2170	5150	0.0	2430	1810	5820	0.0	2850	2090
Ar(in²)	11	5100	0.2	2280	1690	5780	0.2	2700	1960	4960	0.2	2190	1630	5580	0.2	2570	1880
=16.00	13	5030	0.3	2000	1480	5690	0.3	2360	1710	4890	0.3	1910	1420	5490	0.3	2250	1640
	17	4850	0.4	1710	1270	5460	0.4	2020	1470	4710	0.4	1640	1220	5270	0.4	1920	1410
4-#18	21	4640	0.5	1430	1060	5190	0.5	1690	1220	4500	0.5	1370	1020	5000	0.5	1600	1170
2x-2y	25	4390	0.7	856	634	4880	0.7	1010	733	4250	0.7	820	610	4690	0.7	962	704
	40	3290	0.9	285	211	3510	0.9	337	244	3160	0.9	273	203	3350	0.9	320	234
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1570	880	9.60	7.20	1570	880	9.60	7.20	1470	829	9.60	7.20	1470	829	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 8.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 32

Designation		W 14 x176								W 14 x159							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.52 %	0	4630	0.0	1660	1280	5250	0.0	2050	1550	4500	0.0	1560	1210	5050	0.0	1910	1460
Ar(in²)	11	4470	0.2	1500	1150	5040	0.2	1840	1390	4340	0.2	1410	1090	4850	0.2	1720	1310
= 4.00	13	4410	0.3	1310	1010	4970	0.3	1610	1220	4270	0.3	1230	949	4770	0.3	1500	1150
	17	4260	0.4	1120	865	4770	0.4	1380	1050	4120	0.4	1050	814	4580	0.4	1290	985
4-# 9	21	4080	0.5	935	721	4540	0.5	1150	871	3940	0.5	879	678	4350	0.5	1070	820
2x-2y	25	3860	0.7	561	432	4270	0.7	690	522	3720	0.7	527	407	4090	0.7	643	492
	40	2910	0.9	187	144	3100	0.9	230	174	2770	0.9	175	135	2940	0.9	214	164
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1390	783	9.60	7.20	1390	783	9.60	7.20	1300	732	9.60	7.20	1300	732	9.60	7.20
1.04 %	0	4760	0.0	1900	1380	5380	0.0	2280	1650	4620	0.0	1800	1310	5180	0.0	2140	1560
Ar(in²)	11	4590	0.2	1710	1240	5160	0.2	2050	1490	4450	0.2	1620	1180	4970	0.2	1930	1400
= 8.00	13	4530	0.3	1500	1090	5080	0.3	1800	1300	4390	0.3	1420	1030	4880	0.3	1690	1230
	17	4370	0.4	1280	933	4880	0.4	1540	1110	4230	0.4	1220	882	4680	0.4	1450	1050
8-# 9	21	4170	0.5	1070	777	4630	0.5	1280	928	4030	0.5	1010	735	4440	0.5	1210	877
4x-2y	25	3950	0.7	641	466	4350	0.7	770	557	3810	0.7	607	441	4170	0.7	723	526
	40	2950	0.9	213	155	3130	0.9	256	185	2810	0.9	202	147	2970	0.9	241	175
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1390	782	9.60	7.20	1390	782	9.60	7.20	1300	731	9.60	7.20	1300	731	9.60	7.20
2.08 %	0	5010	0.0	2330	1740	5630	0.0	2710	2000	4880	0.0	2230	1660	5430	0.0	2570	1910
Ar(in²)	11	4820	0.2	2100	1560	5390	0.2	2440	1800	4690	0.2	2010	1500	5200	0.2	2310	1720
=16.00	13	4750	0.3	1830	1370	5300	0.3	2130	1580	4610	0.3	1750	1310	5110	0.3	2020	1510
	17	4570	0.4	1570	1170	5080	0.4	1830	1350	4430	0.4	1500	1120	4890	0.4	1740	1290
4-#18	21	4360	0.5	1310	977	4810	0.5	1520	1130	4220	0.5	1250	935	4620	0.5	1450	1080
2x-2y	25	4110	0.7	786	586	4510	0.7	914	675	3970	0.7	752	561	4320	0.7	867	645
	40	3020	0.9	262	195	3190	0.9	304	225	2880	0.9	250	187	3020	0.9	289	215
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1390	779	9.60	7.20	1390	779	9.60	7.20	1300	728	9.60	7.20	1300	728	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = $Pex(KxLx)^2/10000.$ (kip-ft²), Cey = $Pey(KyLy)^2/10000.$ (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 32

Designation		W 14 x145								W 14 x132							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.52 %	0	4390	0.0	1480	1140	4900	0.0	1790	1380	4290	0.0	1410	1070	4750	0.0	1690	1300
Ar(in²)	11	4230	0.2	1330	1030	4700	0.2	1620	1250	4120	0.2	1260	965	4550	0.2	1520	1170
= 4.00	13	4170	0.3	1170	899	4620	0.3	1410	1090	4060	0.3	1110	845	4470	0.3	1330	1020
	17	4010	0.4	1000	771	4430	0.4	1210	933	3910	0.4	948	724	4280	0.4	1140	874
4-# 9	21	3830	0.5	833	642	4200	0.5	1010	778	3720	0.5	790	603	4060	0.5	950	728
2x-2y	25	3610	0.7	500	385	3940	0.7	605	466	3510	0.7	474	362	3800	0.7	570	437
	40	2670	0.9	166	128	2810	0.9	201	155	2560	0.9	158	120	2680	0.9	190	145
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1230	693	9.60	7.20	1230	693	9.60	7.20	1160	654	9.60	7.20	1160	654	9.60	7.20
1.04 %	0	4520	0.0	1720	1240	5030	0.0	2030	1480	4420	0.0	1640	1170	4880	0.0	1930	1400
Ar(in²)	11	4350	0.2	1550	1120	4810	0.2	1830	1340	4240	0.2	1480	1060	4660	0.2	1730	1260
= 8.00	13	4280	0.3	1350	979	4730	0.3	1600	1170	4170	0.3	1290	924	4580	0.3	1520	1100
	17	4120	0.4	1160	839	4530	0.4	1370	1000	4010	0.4	1110	792	4390	0.4	1300	942
8-# 9	21	3920	0.5	966	699	4290	0.5	1140	835	3810	0.5	924	660	4150	0.5	1080	785
4x-2y	25	3700	0.7	580	419	4020	0.7	685	501	3590	0.7	554	396	3880	0.7	650	471
	40	2700	0.9	193	139	2840	0.9	228	167	2590	0.9	184	132	2710	0.9	216	157
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1230	691	9.60	7.20	1230	691	9.60	7.20	1160	652	9.60	7.20	1160	652	9.60	7.20
2.08 %	0	4770	0.0	2150	1600	5280	0.0	2460	1840	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	4580	0.2	1930	1440	5040	0.2	2210	1650	0	0.2	0	0	0	0.2	0	0
=16.00	13	4500	0.3	1690	1260	4950	0.3	1940	1450	0	0.3	0	0	0	0.3	0	0
	17	4320	0.4	1450	1080	4730	0.4	1660	1240	0	0.4	0	0	0	0.4	0	0
4-#18	21	4110	0.5	1210	900	4470	0.5	1380	1030	0	0.5	0	0	0	0.5	0	0
2x-2y	25	3860	0.7	724	540	4170	0.7	830	620	0	0.7	0	0	0	0.7	0	0
	40	2760	0.9	241	180	2890	0.9	276	206	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1220	688	9.60	7.20	1220	688	9.60	7.20	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 8.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 32

Designation		W 14 x120							
Fy (ksi)		36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.52 %	0	4200	0.0	1340	1020	4620	0.0	1600	1230
Ar(in²)	11	4030	0.2	1200	913	4420	0.2	1440	1110
= 4.00	13	3970	0.3	1050	799	4340	0.3	1260	966
	17	3810	0.4	902	685	4150	0.4	1080	828
4-# 9	21	3620	0.5	752	571	3930	0.5	898	690
2x-2y	25	3410	0.7	451	342	3670	0.7	538	414
	40	2460	0.9	150	114	2570	0.9	179	138
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1100	619	9.60	7.20	1100	619	9.60	7.20
1.04 %	0	4320	0.0	1580	1120	4740	0.0	1830	1330
Ar(in²)	11	4150	0.2	1420	1000	4530	0.2	1650	1200
= 8.00	13	4080	0.3	1240	879	4450	0.3	1440	1050
	17	3910	0.4	1060	753	4250	0.4	1240	896
8-# 9	21	3710	0.5	885	628	4010	0.5	1030	747
4x-2y	25	3490	0.7	531	376	3750	0.7	619	448
	40	2490	0.9	177	125	2590	0.9	206	149
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1100	618	9.60	7.20	1100	618	9.60	7.20
1.98 %	0	4550	0.0	1930	1390	4970	0.0	2190	1600
Ar(in²)	11	4360	0.2	1740	1250	4740	0.2	1970	1440
=15.24	13	4280	0.3	1520	1090	4650	0.3	1730	1260
	17	4100	0.4	1300	936	4430	0.4	1480	1080
12-#10	21	3880	0.5	1090	780	4170	0.5	1230	899
4x-4y	25	3630	0.7	652	468	3880	0.7	739	539
	40	2540	0.9	217	156	2630	0.9	246	179
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1090	615	9.60	7.20	1090	615	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	. .00	.00	0	0	.00	.00

Designation		W 14 x109							
Fy (ksi)		36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.52 %	0	4110	0.0	1270	958	4490	0.0	1510	1160
Ar(in²)	11	3940	0.2	1150	862	4290	0.2	1360	1040
= 4.00	13	3880	0.3	1000	754	4210	0.3	1190	913
	17	3720	0.4	859	646	4030	0.4	1020	782
4-# 9	21	3530	0.5	716	538	3800	0.5	849	652
2x-2y	25	3310	0.7	429	323	3550	0.7	509	391
	40	2370	0.9	143	107	2460	0.9	169	130
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1040	586	9.60	7.20	1040	586	9.60	7.20
1.04 %	0	4240	0.0	1510	1060	4620	0.0	1750	1260
Ar(in²)	11	4060	0.2	1360	953	4400	0.2	1570	1130
= 8.00	13	3990	0.3	1190	834	4320	0.3	1380	992
	17	3820	0.4	1020	714	4130	0.4	1180	851
8-# 9	21	3620	0.5	850	595	3890	0.5	982	709
4x-2y	25	3390	0.7	510	357	3620	0.7	589	425
	40	2390	0.9	170	119	2480	0.9	196	141
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1040	585	9.60	7.20	1040	585	9.60	7.20
1.98 %	0	4460	0.0	1870	1340	4840	0.0	2100	1530
Ar(in²)	11	4260	0.2	1680	1210	4610	0.2	1890	1380
=15.24	13	4190	0.3	1470	1060	4520	0.3	1660	1210
	17	4000	0.4	1260	904	4300	0.4	1420	1030
12-#10	21	3780	0.5	1050	753	4040	0.5	1180	861
4x-4y	25	3530	0.7	630	452	3750	0.7	709	516
	40	2440	0.9	210	150	2520	0.9	236	172
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1040	582	9.60	7.20	1040	582	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 32

Designation		W 12 x336								W 12 x305							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.52 %	0	5880	0.0	2580	1760	7060	0.0	3280	2090	5640	0.0	2390	1670	6700	0.0	3020	1980
Ar(in²)	11	5720	0.2	2320	1580	6820	0.2	2950	1880	5480	0.2	2150	1500	6480	0.2	2720	1780
= 4.00	13	5650	0.3	2030	1380	6730	0.3	2580	1650	5410	0.3	1880	1310	6390	0.3	2380	1560
	17	5500	0.4	1740	1190	6510	0.4	2220	1410	5260	0.4	1610	1120	6170	0.4	2040	1340
4-# 9	21	5310	0.5	1450	988	6240	0.5	1850	1180	5070	0.5	1340	936	5910	0.5	1700	1110
2x-2y	25	5090	0.7	871	593	5930	0.7	1110	706	4850	0.7	806	561	5610	0.7	1020	668
	40	4060	0.9	290	197	4530	0.9	369	235	3840	0.9	268	187	4250	0.9	339	222
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2220	1250	9.60	7.20	2220	1250	9.60	7.20	2060	1160	9.60	7.20	2060	1160	9.60	7.20
1.04 %	0	6010	0.0	2820	1860	7180	0.0	3520	2190	5760	0.0	2630	1760	6830	0.0	3250	2080
Ar(in²)	11	5840	0.2	2540	1670	6940	0.2	3170	1970	5590	0.2	2360	1590	6590	0.2	2930	1870
= 8.00	13	5770	0.3	2220	1460	6850	0.3	2770	1730	5530	0.3	2070	1390	6500	0.3	2560	1640
	17	5610	0.4	1900	1250	6620	0.4	2370	1480	5370	0.4	1770	1190	6280	0.4	2200	1400
8-# 9	21	5410	0.5	1590	1040	6340	0.5	1980	1230	5170	0.5	1480	991	6010	0.5	1830	1170
4x-2y	25	5180	0.7	951	626	6020	0.7	1190	739	4940	0.7	886	595	5700	0.7	1100	700
	40	4110	0.9	317	208	4570	0.9	395	246	3890	0.9	295	198	4290	0.9	366	233
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2220	1250	9.60	7.20	2220	1250	9.60	7.20	2060	1160	9.60	7.20	2060	1160	9.60	7.20
1.98 %	0	6240	0.0	3170	2120	7410	0.0	3870	2450	5990	0.0	2980	2030	7060	0.0	3610	2340
Ar(in²)	11	6050	0.2	2860	1910	7150	0.2	3490	2210	5810	0.2	2680	1830	6810	0.2	3250	2110
=15.24	13	5980	0.3	2500	1670	7050	0.3	3050	1930	5740	0.3	2350	1600	6710	0.3	2840	1840
	17	5810	0.4	2140	1430	6810	0.4	2610	1660	5570	0.4	2010	1370	6470	0.4	2440	1580
12-#10	21	5590	0.5	1790	1190	6510	0.5	2180	1380	5350	0.5	1680	1140	6180	0.5	2030	1320
4x-4y	25	5350	0.7	1070	716	6170	0.7	1310	827	5110	0.7	1010	685	5850	0.7	1220	789
	40	4210	0.9	357	238	4640	0.9	435	275	3980	0.9	335	228	4360	0.9	405	263
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2220	1250	9.60	7.20	2220	1250	9.60	7.20	2060	1160	9.60	7.20	2060	1160	9.60	7.20
3.25 %	0	6540	0.0	3510	2500	7720	0.0	4210	2830	6300	0.0	3320	2410	7370	0.0	3950	2720
Ar(in²)	11	6340	0.2	3160	2250	7440	0.2	3790	2550	6100	0.2	2990	2170	7090	0.2	3550	2450
=24.96	13	6260	0.3	2770	1970	7330	0.3	3320	2230	6020	0.3	2620	1900	6980	0.3	3110	2140
	17	6070	0.4	2370	1690	7070	0.4	2840	1910	5830	0.4	2240	1630	6720	0.4	2660	1830
16-#11	21	5840	0.5	1980	1410	6750	0.5	2370	1590	5590	0.5	1870	1350	6410	0.5	2220	1530
4x-6y	25	5570	0.7	1190	843	6380	0.7	1420	954	5320	0.7	1120	812	6050	0.7	1330	917
	40	4320	0.9	395	281	4730	0.9	473	318	4100	0.9	373	270	4450	0.9	444	305
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		2210	1240	9.60	7.20	2210	1240	9.60	7.20	2050	1150	9.60	7.20	2050	1150	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes :
1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 8.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 32

Designation		W 12 x279								W 12 x252							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.52 %	0	5430	0.0	2230	1580	6410	0.0	2800	1880	5230	0.0	2070	1500	6110	0.0	2580	1780
Ar(in²)	11	5270	0.2	2010	1430	6180	0.2	2520	1690	5070	0.2	1860	1350	5890	0.2	2320	1600
= 4.00	13	5210	0.3	1750	1250	6100	0.3	2200	1480	5000	0.3	1630	1180	5810	0.3	2030	1400
	17	5060	0.4	1500	1070	5890	0.4	1890	1270	4850	0.4	1400	1010	5600	0.4	1740	1200
4-# 9	21	4870	0.5	1250	891	5630	0.5	1570	1060	4670	0.5	1160	844	5350	0.5	1450	999
2x-2y	25	4660	0.7	752	534	5340	0.7	943	634	4450	0.7	698	506	5070	0.7	870	599
	40	3660	0.9	250	178	4020	0.9	314	211	3470	0.9	232	168	3780	0.9	290	199
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1930	1080	9.60	7.20	1930	1080	9.60	7.20	1790	1010	9.60	7.20	1790	1010	9.60	7.20
1.04 %	0	5560	0.0	2470	1680	6530	0.0	3030	1980	5350	0.0	2310	1600	6230	0.0	2810	1880
Ar(in²)	11	5390	0.2	2220	1510	6300	0.2	2730	1780	5180	0.2	2080	1440	6010	0.2	2530	1690
= 8.00	13	5330	0.3	1940	1330	6210	0.3	2390	1560	5120	0.3	1820	1260	5920	0.3	2220	1480
	17	5170	0.4	1660	1140	6000	0.4	2050	1330	4960	0.4	1560	1080	5710	0.4	1900	1270
8-# 9	21	4970	0.5	1390	946	5730	0.5	1710	1110	4770	0.5	1300	901	5450	0.5	1580	1050
4x-2y	25	4750	0.7	832	568	5430	0.7	1020	667	4540	0.7	778	540	5150	0.7	949	632
	40	3710	0.9	277	189	4060	0.9	341	222	3520	0.9	259	180	3820	0.9	316	210
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1920	1080	9.60	7.20	1920	1080	9.60	7.20	1790	1000	9.60	7.20	1790	1000	9.60	7.20
1.98 %	0	5790	0.0	2820	1950	6760	0.0	3390	2240	5580	0.0	2660	1870	6460	0.0	3170	2140
Ar(in²)	11	5610	0.2	2540	1760	6510	0.2	3050	2020	5400	0.2	2400	1680	6220	0.2	2850	1930
=15.24	13	5530	0.3	2220	1540	6420	0.3	2670	1770	5330	0.3	2100	1470	6120	0.3	2500	1690
	17	5360	0.4	1900	1320	6190	0.4	2290	1510	5160	0.4	1800	1260	5900	0.4	2140	1450
12-#10	21	5150	0.5	1590	1100	5900	0.5	1900	1260	4940	0.5	1500	1050	5620	0.5	1780	1210
4x-4y	25	4910	0.7	951	658	5580	0.7	1140	756	4700	0.7	898	630	5300	0.7	1070	723
	40	3790	0.9	317	219	4130	0.9	380	252	3600	0.9	299	210	3890	0.9	356	241
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1920	1080	9.60	7.20	1920	1080	9.60	7.20	1780	1000	9.60	7.20	1780	1000	9.60	7.20
3.25 %	0	6090	0.0	3160	2330	7070	0.0	3730	2620	5890	0.0	3000	2250	6770	0.0	3510	2520
Ar(in²)	11	5890	0.2	2840	2100	6800	0.2	3350	2360	5680	0.2	2700	2020	6500	0.2	3160	2270
=24.96	13	5810	0.3	2490	1830	6690	0.3	2930	2060	5610	0.3	2360	1770	6400	0.3	2760	1980
	17	5620	0.4	2130	1570	6440	0.4	2520	1770	5410	0.4	2030	1520	6150	0.4	2370	1700
16-#11	21	5390	0.5	1780	1310	6130	0.5	2100	1470	5180	0.5	1690	1260	5840	0.5	1970	1420
4x-6y	25	5120	0.7	1070	786	5780	0.7	1260	883	4910	0.7	1010	758	5490	0.7	1180	850
	40	3900	0.9	355	262	4210	0.9	419	294	3700	0.9	337	252	3970	0.9	394	283
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1910	1080	9.60	7.20	1910	1080	9.60	7.20	1770	998	9.60	7.20	1770	998	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. $Cex = Pex(KxLx)^2/10000.$ (kip-ft²), $Cey = Pey(KyLy)^2/10000.$ (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 32

Designation		W 12 x230								W 12 x210							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.52 %	0	5060	0.0	1950	1430	5860	0.0	2410	1690	4900	0.0	1830	1360	5630	0.0	2250	1610
Ar(in²)	11	4900	0.2	1750	1290	5650	0.2	2170	1520	4740	0.2	1650	1230	5420	0.2	2020	1450
= 4.00	13	4830	0.3	1530	1130	5570	0.3	1890	1330	4680	0.3	1440	1070	5340	0.3	1770	1270
	17	4680	0.4	1310	965	5360	0.4	1620	1140	4530	0.4	1240	919	5150	0.4	1520	1090
4-# 9	21	4500	0.5	1090	804	5120	0.5	1350	952	4340	0.5	1030	766	4910	0.5	1260	906
2x-2y	25	4290	0.7	656	482	4840	0.7	811	571	4130	0.7	617	459	4630	0.7	758	543
	40	3310	0.9	218	160	3590	0.9	270	190	3160	0.9	205	153	3410	0.9	252	181
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1670	941	9.60	7.20	1670	941	9.60	7.20	1570	883	9.60	7.20	1570	883	9.60	7.20
1.04 %	0	5180	0.0	2180	1530	5990	0.0	2640	1790	5030	0.0	2070	1460	5760	0.0	2480	1710
Ar(in²)	11	5010	0.2	1960	1380	5760	0.2	2380	1610	4860	0.2	1860	1320	5540	0.2	2240	1540
= 8.00	13	4950	0.3	1720	1210	5680	0.3	2080	1410	4790	0.3	1630	1150	5460	0.3	1960	1350
	17	4790	0.4	1470	1030	5470	0.4	1780	1210	4630	0.4	1400	987	5250	0.4	1680	1150
8-# 9	21	4600	0.5	1230	861	5210	0.5	1490	1010	4440	0.5	1160	823	5000	0.5	1400	961
4x-2y	25	4370	0.7	736	516	4920	0.7	891	604	4220	0.7	697	493	4710	0.7	838	577
	40	3360	0.9	245	172	3630	0.9	297	201	3210	0.9	232	164	3440	0.9	279	192
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1670	940	9.60	7.20	1670	940	9.60	7.20	1570	881	9.60	7.20	1570	881	9.60	7.20
1.98 %	0	5410	0.0	2540	1800	6220	0.0	3000	2060	5250	0.0	2420	1730	5990	0.0	2840	1980
Ar(in²)	11	5230	0.2	2280	1620	5980	0.2	2700	1850	5070	0.2	2180	1560	5750	0.2	2560	1780
=15.24	13	5160	0.3	2000	1420	5880	0.3	2360	1620	5000	0.3	1910	1360	5660	0.3	2240	1560
	17	4980	0.4	1710	1210	5660	0.4	2020	1390	4830	0.4	1640	1170	5440	0.4	1920	1340
12-#10	21	4770	0.5	1430	1010	5380	0.5	1690	1160	4610	0.5	1360	973	5170	0.5	1600	1110
4x-4y	25	4530	0.7	856	607	5070	0.7	1010	694	4370	0.7	817	583	4860	0.7	958	667
	40	3430	0.9	285	202	3690	0.9	337	231	3280	0.9	272	194	3500	0.9	319	222
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1670	937	9.60	7.20	1670	937	9.60	7.20	1560	879	9.60	7.20	1560	879	9.60	7.20
3.25 %	0	5720	0.0	2880	2180	6520	0.0	3340	2430	5560	0.0	2760	2120	6300	0.0	3180	2360
Ar(in²)	11	5510	0.2	2590	1960	6260	0.2	3000	2190	5360	0.2	2490	1900	6030	0.2	2860	2120
=24.96	13	5430	0.3	2270	1720	6160	0.3	2630	1920	5280	0.3	2180	1670	5930	0.3	2500	1850
	17	5240	0.4	1940	1470	5910	0.4	2250	1640	5080	0.4	1860	1430	5680	0.4	2150	1590
16-#11	21	5010	0.5	1620	1230	5610	0.5	1880	1370	4850	0.5	1550	1190	5390	0.5	1790	1320
4x-6y	25	4740	0.7	971	736	5260	0.7	1130	821	4570	0.7	932	713	5050	0.7	1070	794
	40	3530	0.9	323	245	3760	0.9	375	273	3370	0.9	310	237	3570	0.9	357	264
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1660	934	9.60	7.20	1660	934	9.60	7.20	1560	875	9.60	7.20	1560	875	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 8.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 24 x 32

Designation		W 12 x190								W 12 x170							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.52 %	0	4740	0.0	1720	1290	5400	0.0	2090	1530	4590	0.0	1610	1220	5180	0.0	1940	1440
Ar(in²)	11	4580	0.2	1550	1160	5200	0.2	1880	1370	4430	0.2	1450	1090	4980	0.2	1750	1300
= 4.00	13	4520	0.3	1350	1020	5120	0.3	1650	1200	4360	0.3	1270	957	4900	0.3	1530	1130
	17	4370	0.4	1160	871	4920	0.4	1410	1030	4210	0.4	1080	820	4710	0.4	1310	972
4-# 9	21	4180	0.5	965	726	4690	0.5	1180	859	4030	0.5	903	683	4470	0.5	1090	810
2x-2y	25	3970	0.7	579	435	4420	0.7	706	515	3810	0.7	542	410	4210	0.7	655	486
	40	3010	0.9	193	145	3220	0.9	235	171	2860	0.9	180	136	3040	0.9	218	162
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1460	823	9.60	7.20	1460	823	9.60	7.20	1360	765	9.60	7.20	1360	765	9.60	7.20
1.04 %	0	4870	0.0	1950	1390	5530	0.0	2330	1630	4710	0.0	1840	1320	5310	0.0	2180	1540
Ar(in²)	11	4700	0.2	1760	1250	5310	0.2	2100	1470	4540	0.2	1660	1180	5090	0.2	1960	1390
= 8.00	13	4630	0.3	1540	1100	5230	0.3	1830	1280	4480	0.3	1450	1040	5010	0.3	1720	1210
	17	4470	0.4	1320	939	5030	0.4	1570	1100	4320	0.4	1250	888	4810	0.4	1470	1040
8-# 9	21	4280	0.5	1100	782	4780	0.5	1310	915	4120	0.5	1040	740	4560	0.5	1230	867
4x-2y	25	4060	0.7	659	469	4500	0.7	786	549	3900	0.7	622	444	4290	0.7	735	520
	40	3050	0.9	219	156	3260	0.9	262	183	2900	0.9	207	148	3070	0.9	245	173
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1460	822	9.60	7.20	1460	822	9.60	7.20	1360	764	9.60	7.20	1360	764	9.60	7.20
1.98 %	0	5100	0.0	2310	1660	5760	0.0	2690	1890	4940	0.0	2200	1590	5540	0.0	2530	1810
Ar(in²)	11	4910	0.2	2080	1490	5520	0.2	2420	1700	4750	0.2	1980	1430	5300	0.2	2280	1630
=15.24	13	4840	0.3	1820	1310	5430	0.3	2110	1490	4680	0.3	1730	1250	5210	0.3	2000	1420
	17	4660	0.4	1560	1120	5210	0.4	1810	1280	4510	0.4	1490	1070	4990	0.4	1710	1220
12-#10	21	4450	0.5	1300	933	4940	0.5	1510	1070	4290	0.5	1240	891	4730	0.5	1430	1020
4x-4y	25	4210	0.7	779	559	4640	0.7	906	639	4050	0.7	742	535	4430	0.7	855	610
	40	3120	0.9	259	186	3310	0.9	302	213	2960	0.9	247	178	3120	0.9	285	203
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1460	819	9.60	7.20	1460	819	9.60	7.20	1350	761	9.60	7.20	1350	761	9.60	7.20
3.25 %	0	5400	0.0	2650	2040	6070	0.0	3020	2270	5250	0.0	2540	1970	5840	0.0	2870	2190
Ar(in²)	11	5190	0.2	2380	1840	5800	0.2	2720	2050	5040	0.2	2290	1770	5580	0.2	2590	1970
=24.96	13	5110	0.3	2090	1610	5700	0.3	2380	1790	4950	0.3	2000	1550	5480	0.3	2260	1720
	17	4920	0.4	1790	1380	5460	0.4	2040	1530	4760	0.4	1710	1330	5240	0.4	1940	1480
16-#11	21	4680	0.5	1490	1150	5160	0.5	1700	1280	4520	0.5	1430	1110	4940	0.5	1620	1230
4x-6y	25	4410	0.7	894	690	4830	0.7	1020	767	4240	0.7	857	665	4610	0.7	969	738
	40	3210	0.9	298	230	3380	0.9	340	255	3040	0.9	285	221	3180	0.9	323	246
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1450	816	9.60	7.20	1450	816	9.60	7.20	1350	758	9.60	7.20	1350	758	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85   f'c : 8.0 ksi NW
φb = 0.90   Fyr : 60 ksi
Column Size(b x h): 24 x 32

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Designation		W 12 x152								W 12 x136							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.52 %	0	4450	0.0	1510	1150	4980	0.0	1810	1360	4320	0.0	1420	1080	4790	0.0	1690	1280
Ar(in²)	11	4280	0.2	1360	1030	4770	0.2	1630	1220	4150	0.2	1280	968	4590	0.2	1520	1150
= 4.00	13	4220	0.3	1190	901	4700	0.3	1420	1070	4090	0.3	1120	847	4510	0.3	1330	1010
	17	4070	0.4	1020	772	4510	0.4	1220	917	3940	0.4	960	726	4330	0.4	1140	863
4-# 9	21	3880	0.5	849	644	4280	0.5	1020	764	3750	0.5	800	605	4100	0.5	950	719
2x-2y	25	3670	0.7	509	386	4020	0.7	610	458	3540	0.7	480	363	3840	0.7	570	431
	40	2720	0.9	169	128	2870	0.9	203	152	2590	0.9	160	121	2720	0.9	190	143
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1270	713	9.60	7.20	1270	713	9.60	7.20	1180	665	9.60	7.20	1180	665	9.60	7.20
1.04 %	0	4570	0.0	1750	1250	5100	0.0	2050	1460	4440	0.0	1660	1180	4920	0.0	1930	1380
Ar(in²)	11	4400	0.2	1570	1120	4890	0.2	1840	1310	4270	0.2	1490	1060	4710	0.2	1730	1240
= 8.00	13	4330	0.3	1380	981	4810	0.3	1610	1150	4200	0.3	1310	927	4630	0.3	1520	1090
	17	4170	0.4	1180	841	4610	0.4	1380	985	4040	0.4	1120	794	4430	0.4	1300	932
8-# 9	21	3980	0.5	982	700	4370	0.5	1150	821	3840	0.5	933	662	4190	0.5	1080	776
4x-2y	25	3750	0.7	589	420	4090	0.7	690	492	3620	0.7	560	397	3920	0.7	649	466
	40	2760	0.9	196	140	2900	0.9	230	164	2620	0.9	186	132	2740	0.9	216	155
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1270	711	9.60	7.20	1270	711	9.60	7.20	1180	663	9.60	7.20	1180	663	9.60	7.20
1.98 %	0	4800	0.0	2100	1520	5330	0.0	2400	1730	4670	0.0	2020	1450	5150	0.0	2280	1650
Ar(in²)	11	4610	0.2	1890	1360	5100	0.2	2160	1550	4480	0.2	1810	1300	4910	0.2	2050	1480
=15.24	13	4540	0.3	1660	1190	5010	0.3	1890	1360	4410	0.3	1590	1140	4830	0.3	1800	1300
	17	4360	0.4	1420	1020	4790	0.4	1620	1170	4230	0.4	1360	976	4610	0.4	1540	1110
12-#10	21	4140	0.5	1180	852	4530	0.5	1350	971	4010	0.5	1130	813	4350	0.5	1280	927
4x-4y	25	3900	0.7	709	511	4230	0.7	810	582	3760	0.7	680	488	4050	0.7	769	556
	40	2820	0.9	236	170	2950	0.9	270	194	2680	0.9	226	162	2790	0.9	256	185
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1260	709	9.60	7.20	1260	709	9.60	7.20	1180	661	9.60	7.20	1180	661	9.60	7.20
3.25 %	0	5110	0.0	2440	1900	5640	0.0	2740	2110	4980	0.0	2360	1830	5460	0.0	2620	2030
Ar(in²)	11	4890	0.2	2200	1710	5380	0.2	2470	1900	4760	0.2	2120	1650	5190	0.2	2360	1830
=24.96	13	4810	0.3	1920	1500	5280	0.3	2160	1660	4680	0.3	1860	1440	5090	0.3	2060	1600
	17	4610	0.4	1650	1280	5030	0.4	1850	1430	4470	0.4	1590	1240	4850	0.4	1770	1370
16-#11	21	4370	0.5	1370	1070	4740	0.5	1540	1190	4230	0.5	1330	1030	4560	0.5	1470	1140
4x-6y	25	4090	0.7	824	642	4410	0.7	925	712	3950	0.7	795	619	4230	0.7	884	686
	40	2890	0.9	274	214	3000	0.9	308	237	2740	0.9	265	206	2840	0.9	294	228
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1250	705	9.60	7.20	1250	705	9.60	7.20	1170	657	9.60	7.20	1170	657	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 8.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 32

Designation		W 12 x120							
Fy (ksi)		36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.52 %	0	4200	0.0	1340	1010	4620	0.0	1580	1200
Ar(in²)	11	4030	0.2	1210	905	4420	0.2	1420	1080
= 4.00	13	3970	0.3	1050	792	4340	0.3	1240	943
	17	3810	0.4	904	678	4150	0.4	1060	808
4-# 9	21	3620	0.5	753	565	3930	0.5	886	674
2x-2y	25	3410	0.7	452	339	3670	0.7	531	404
	40	2460	0.9	150	113	2570	0.9	177	134
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1100	619	9.60	7.20	1100	619	9.60	7.20
1.04 %	0	4320	0.0	1580	1110	4740	0.0	1810	1300
Ar(in²)	11	4150	0.2	1420	996	4530	0.2	1630	1170
= 8.00	13	4080	0.3	1240	871	4450	0.3	1430	1020
	17	3910	0.4	1060	747	4250	0.4	1220	877
8-# 9	21	3710	0.5	886	622	4010	0.5	1020	730
4x-2y	25	3490	0.7	532	373	3750	0.7	611	438
	40	2490	0.9	177	124	2590	0.9	203	146
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1100	618	9.60	7.20	1100	618	9.60	7.20
1.98 %	0	4550	0.0	1930	1380	4970	0.0	2170	1570
Ar(in²)	11	4360	0.2	1740	1240	4740	0.2	1950	1410
=15.24	13	4280	0.3	1520	1080	4650	0.3	1710	1230
	17	4100	0.4	1300	929	4430	0.4	1460	1060
12-#10	21	3880	0.5	1090	774	4170	0.5	1220	882
4x-4y	25	3630	0.7	652	464	3880	0.7	731	529
	40	2540	0.9	217	154	2630	0.9	243	176
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1090	615	9.60	7.20	1090	615	9.60	7.20
3.25 %	0	4860	0.0	2270	1770	5280	0.0	2510	1950
Ar(in²)	11	4630	0.2	2050	1590	5010	0.2	2260	1760
=24.96	13	4550	0.3	1790	1390	4910	0.3	1970	1540
	17	4340	0.4	1530	1190	4670	0.4	1690	1320
16-#11	21	4090	0.5	1280	993	4380	0.5	1410	1100
4x-6y	25	3810	0.7	767	595	4050	0.7	846	659
	40	2600	0.9	255	198	2680	0.9	282	219
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1090	612	9.60	7.20	1090	612	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00

Designation		W 12 x106							
Fy (ksi)		36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.52 %	0	4090	0.0	1270	938	4460	0.0	1480	1120
Ar(in²)	11	3920	0.2	1140	844	4260	0.2	1330	1010
= 4.00	13	3850	0.3	997	739	4180	0.3	1160	883
	17	3700	0.4	854	633	4000	0.4	996	756
4-# 9	21	3510	0.5	712	528	3770	0.5	830	630
2x-2y	25	3290	0.7	427	316	3520	0.7	498	378
	40	2340	0.9	142	105	2430	0.9	166	126
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1030	578	9.60	7.20	1030	578	9.60	7.20
1.04 %	0	4210	0.0	1500	1040	4590	0.0	1710	1220
Ar(in²)	11	4030	0.2	1350	935	4370	0.2	1540	1100
= 8.00	13	3970	0.3	1180	818	4290	0.3	1350	962
	17	3800	0.4	1020	701	4100	0.4	1160	825
8-# 9	21	3600	0.5	845	584	3860	0.5	963	687
4x-2y	25	3370	0.7	507	350	3590	0.7	577	412
	40	2370	0.9	169	116	2450	0.9	192	137
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1030	577	9.60	7.20	1030	577	9.60	7.20
1.98 %	0	4440	0.0	1860	1310	4810	0.0	2070	1490
Ar(in²)	11	4240	0.2	1670	1180	4580	0.2	1860	1340
=15.24	13	4170	0.3	1460	1030	4490	0.3	1630	1170
	17	3980	0.4	1260	885	4270	0.4	1400	1010
12-#10	21	3760	0.5	1050	737	4010	0.5	1160	839
4x-4y	25	3500	0.7	627	442	3720	0.7	697	503
	40	2420	0.9	209	147	2490	0.9	232	167
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1020	574	9.60	7.20	1020	574	9.60	7.20
3.25 %	0	4750	0.0	2200	1700	5120	0.0	2410	1880
Ar(in²)	11	4520	0.2	1980	1530	4860	0.2	2170	1690
=24.96	13	4430	0.3	1730	1340	4750	0.3	1900	1480
	17	4220	0.4	1490	1150	4510	0.4	1630	1270
16-#11	21	3970	0.5	1240	956	4220	0.5	1350	1060
4x-6y	25	3680	0.7	742	574	3890	0.7	812	633
	40	2470	0.9	247	191	2530	0.9	270	211
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1020	571	9.60	7.20	1020	571	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 28

Designation		W 14 x426								W 14 x398							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.51 %	0	6640	0.0	3110	2410	8130	0.0	4100	2910	6430	0.0	2920	2320	7820	0.0	3830	2790
Ar(in²)	11	6510	0.2	2800	2170	7940	0.2	3690	2620	6300	0.2	2630	2090	7640	0.2	3450	2510
= 4.00	13	6460	0.3	2450	1900	7870	0.3	3220	2290	6250	0.3	2300	1830	7560	0.3	3020	2190
	17	6340	0.4	2100	1630	7690	0.4	2760	1960	6130	0.4	1970	1560	7390	0.4	2590	1880
4-# 9	21	6190	0.5	1750	1360	7460	0.5	2300	1630	5990	0.5	1640	1300	7170	0.5	2160	1570
2x-2y	25	6010	0.7	1050	814	7200	0.7	1380	980	5810	0.7	984	782	6920	0.7	1290	940
	40	5150	0.9	349	271	5960	0.9	460	326	4960	0.9	328	260	5710	0.9	431	313
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2070	2070	8.40	8.40	2070	2070	8.40	8.40	1960	1960	8.40	8.40	1960	1960	8.40	8.40
1.02 %	0	6770	0.0	3260	2610	8250	0.0	4250	3100	6550	0.0	3070	2520	7950	0.0	3990	2980
Ar(in²)	11	6640	0.2	2940	2350	8060	0.2	3820	2790	6420	0.2	2770	2260	7760	0.2	3590	2690
= 8.00	13	6580	0.3	2570	2060	7980	0.3	3350	2440	6370	0.3	2420	1980	7680	0.3	3140	2350
	17	6460	0.4	2200	1760	7800	0.4	2870	2090	6250	0.4	2080	1700	7500	0.4	2690	2010
8-# 9	21	6300	0.5	1840	1470	7570	0.5	2390	1750	6090	0.5	1730	1420	7280	0.5	2240	1680
2x-4y	25	6120	0.7	1100	881	7300	0.7	1430	1050	5910	0.7	1040	849	7010	0.7	1350	1010
	40	5230	0.9	367	293	6020	0.9	478	349	5030	0.9	345	283	5770	0.9	448	335
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2060	2060	8.40	8.40	2060	2060	8.40	8.40	1960	1960	8.40	8.40	1960	1960	8.40	8.40
2.30 %	0	7080	0.0	3620	3080	8570	0.0	4610	3570	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	6940	0.2	3260	2770	8360	0.2	4150	3210	0	0.2	0	0	0	0.2	0	0
=18.00	13	6880	0.3	2850	2420	8280	0.3	3630	2810	0	0.3	0	0	0	0.3	0	0
	17	6740	0.4	2450	2080	8080	0.4	3110	2410	0	0.4	0	0	0	0.4	0	0
8-#14	21	6570	0.5	2040	1730	7830	0.5	2590	2010	0	0.5	0	0	0	0.5	0	0
2x-4y	25	6370	0.7	1220	1040	7540	0.7	1560	1200	0	0.7	0	0	0	0.7	0	0
	40	5400	0.9	407	346	6170	0.9	518	401	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2060	2060	8.40	8.40	2060	2060	8.40	8.40	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes :
1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 28 x 28

Designation		W 14 x370								W 14 x342							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.51 %	0	6220	0.0	2730	2220	7510	0.0	3580	2670	6000	0.0	2540	2130	7210	0.0	3320	2550
Ar(in²)	11	6090	0.2	2460	2000	7330	0.2	3220	2400	5880	0.2	2290	1910	7030	0.2	2990	2290
= 4.00	13	6040	0.3	2150	1750	7260	0.3	2820	2100	5830	0.3	2000	1670	6960	0.3	2610	2000
	17	5930	0.4	1840	1500	7090	0.4	2420	1800	5720	0.4	1720	1440	6790	0.4	2240	1720
4-# 9	21	5780	0.5	1540	1250	6880	0.5	2010	1500	5570	0.5	1430	1200	6590	0.5	1870	1430
2x-2y	25	5600	0.7	921	750	6630	0.7	1210	900	5400	0.7	858	717	6340	0.7	1120	859
	40	4770	0.9	307	250	5460	0.9	402	300	4580	0.9	286	239	5200	0.9	373	286
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1850	1850	8.40	8.40	1850	1850	8.40	8.40	1740	1740	8.40	8.40	1740	1740	8.40	8.40
1.02 %	0	6340	0.0	2930	2360	7640	0.0	3780	2800	6130	0.0	2750	2260	7330	0.0	3520	2680
Ar(in²)	11	6210	0.2	2640	2120	7450	0.2	3400	2520	6000	0.2	2470	2030	7150	0.2	3170	2410
= 8.00	13	6160	0.3	2310	1850	7380	0.3	2980	2210	5950	0.3	2160	1780	7080	0.3	2770	2110
	17	6040	0.4	1980	1590	7200	0.4	2550	1890	5830	0.4	1850	1520	6910	0.4	2380	1810
8-# 9	21	5890	0.5	1650	1320	6980	0.5	2130	1580	5680	0.5	1540	1270	6690	0.5	1980	1510
4x-2y	25	5710	0.7	989	794	6730	0.7	1280	945	5500	0.7	926	762	6440	0.7	1190	903
	40	4840	0.9	329	264	5520	0.9	425	315	4640	0.9	308	254	5260	0.9	396	301
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1850	1850	8.40	8.40	1850	1850	8.40	8.40	1740	1740	8.40	8.40	1740	1740	8.40	8.40
2.04 %	0	6600	0.0	3290	2770	7890	0.0	4140	3220	6380	0.0	3110	2680	7590	0.0	3880	3090
Ar(in²)	11	6460	0.2	2960	2500	7690	0.2	3730	2890	6240	0.2	2790	2410	7390	0.2	3500	2780
=16.00	13	6400	0.3	2590	2180	7620	0.3	3260	2530	6190	0.3	2450	2110	7310	0.3	3060	2440
	17	6270	0.4	2220	1870	7430	0.4	2790	2170	6060	0.4	2100	1810	7130	0.4	2620	2090
4-#18	21	6100	0.5	1850	1560	7190	0.5	2330	1810	5890	0.5	1750	1510	6900	0.5	2180	1740
2x-2y	25	5910	0.7	1110	936	6920	0.7	1400	1090	5700	0.7	1050	903	6630	0.7	1310	1040
	40	4980	0.9	370	312	5630	0.9	465	361	4780	0.9	349	301	5380	0.9	436	347
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1840	1840	8.40	8.40	1840	1840	8.40	8.40	1740	1740	8.40	8.40	1740	1740	8.40	8.40
2.55 %	0	6720	0.0	3410	2820	8020	0.0	4240	3260	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	6580	0.2	3070	2540	7810	0.2	3820	2940	0	0.2	0	0	0	0.2	0	0
=20.00	13	6520	0.3	2690	2220	7730	0.3	3340	2570	0	0.3	0	0	0	0.3	0	0
	17	6380	0.4	2300	1900	7540	0.4	2860	2200	0	0.4	0	0	0	0.4	0	0
20-# 9	21	6210	0.5	1920	1590	7300	0.5	2390	1830	0	0.5	0	0	0	0.5	0	0
6x-6y	25	6010	0.7	1150	951	7010	0.7	1430	1100	0	0.7	0	0	0	0.7	0	0
	40	5040	0.9	383	317	5690	0.9	477	366	0	0.9	0	0	0	0.9	0	0
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1840	1840	8.40	8.40	1840	1840	8.40	8.40	0	0	.00	.00	0	0	.00	.00
4.08 %	0	7100	0.0	3700	3520	8400	0.0	4520	3960	6890	0.0	3530	3430	8090	0.0	4280	3840
Ar(in²)	11	6940	0.2	3330	3170	8170	0.2	4070	3560	6730	0.2	3180	3080	7870	0.2	3850	3450
=32.00	13	6880	0.3	2920	2770	8080	0.3	3560	3120	6660	0.3	2780	2700	7780	0.3	3370	3020
	17	6720	0.4	2500	2380	7870	0.4	3050	2670	6510	0.4	2380	2310	7570	0.4	2890	2590
8-#18	21	6530	0.5	2080	1980	7600	0.5	2540	2230	6320	0.5	1980	1930	7310	0.5	2410	2160
2x-4y	25	6300	0.7	1250	1190	7300	0.7	1530	1340	6090	0.7	1190	1160	7000	0.7	1440	1300
	40	5240	0.9	416	396	5860	0.9	508	445	5030	0.9	396	385	5590	0.9	481	431
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1840	1840	8.40	8.40	1840	1840	8.40	8.40	1730	1730	8.40	8.40	1730	1730	8.40	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 28 x 28

Designation		W 14 x311								W 14 x283							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.51 %	0	5750	0.0	2340	2020	6840	0.0	3040	2410	5530	0.0	2160	1910	6530	0.0	2790	2280
Ar(in²)	11	5630	0.2	2110	1810	6670	0.2	2730	2170	5410	0.2	1950	1720	6360	0.2	2510	2050
= 4.00	13	5580	0.3	1840	1590	6600	0.3	2390	1900	5370	0.3	1700	1510	6290	0.3	2200	1800
	17	5460	0.4	1580	1360	6440	0.4	2050	1630	5250	0.4	1460	1290	6130	0.4	1880	1540
4-# 9	21	5320	0.5	1320	1130	6230	0.5	1710	1350	5110	0.5	1220	1080	5940	0.5	1570	1280
2x-2y	25	5150	0.7	789	680	6000	0.7	1030	812	4940	0.7	729	645	5710	0.7	941	770
	40	4340	0.9	263	226	4890	0.9	341	270	4140	0.9	243	215	4630	0.9	313	256
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1610	1610	8.40	8.40	1610	1610	8.40	8.40	1500	1500	8.40	8.40	1500	1500	8.40	8.40
1.02 %	0	5880	0.0	2540	2150	6960	0.0	3240	2540	5660	0.0	2360	2050	6650	0.0	2990	2410
Ar(in²)	11	5750	0.2	2290	1930	6790	0.2	2920	2290	5530	0.2	2130	1840	6480	0.2	2690	2170
= 8.00	13	5700	0.3	2000	1690	6720	0.3	2550	2000	5490	0.3	1860	1610	6410	0.3	2360	1900
	17	5580	0.4	1720	1450	6550	0.4	2190	1710	5360	0.4	1600	1380	6250	0.4	2020	1630
8-# 9	21	5430	0.5	1430	1210	6340	0.5	1820	1430	5220	0.5	1330	1150	6040	0.5	1680	1360
4x-2y	25	5250	0.7	858	725	6090	0.7	1090	857	5040	0.7	797	690	5800	0.7	1010	814
	40	4410	0.9	286	241	4950	0.9	364	285	4200	0.9	265	230	4690	0.9	336	271
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1610	1610	8.40	8.40	1610	1610	8.40	8.40	1500	1500	8.40	8.40	1500	1500	8.40	8.40
2.04 %	0	6130	0.0	2900	2570	7220	0.0	3600	2960	5910	0.0	2720	2470	6910	0.0	3350	2830
Ar(in²)	11	5990	0.2	2610	2310	7030	0.2	3240	2660	5780	0.2	2450	2220	6720	0.2	3020	2550
=16.00	13	5940	0.3	2290	2020	6950	0.3	2830	2330	5720	0.3	2150	1940	6640	0.3	2640	2230
	17	5800	0.4	1960	1730	6770	0.4	2430	2000	5590	0.4	1840	1670	6470	0.4	2260	1910
4-#18	21	5640	0.5	1630	1440	6540	0.5	2020	1660	5430	0.5	1530	1390	6250	0.5	1890	1590
2x-2y	25	5450	0.7	979	866	6280	0.7	1210	997	5240	0.7	919	832	5990	0.7	1130	955
	40	4540	0.9	326	288	5060	0.9	404	332	4330	0.9	306	277	4800	0.9	377	318
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1610	1610	8.40	8.40	1610	1610	8.40	8.40	1500	1500	8.40	8.40	1500	1500	8.40	8.40
3.18 %	0	6410	0.0	3280	2760	7500	0.0	3980	3140	6200	0.0	3110	2650	7190	0.0	3730	3020
Ar(in²)	11	6260	0.2	2960	2480	7290	0.2	3580	2830	6050	0.2	2800	2390	6980	0.2	3360	2720
=24.96	13	6200	0.3	2590	2170	7210	0.3	3140	2480	5990	0.3	2450	2090	6910	0.3	2940	2380
	17	6060	0.4	2220	1860	7020	0.4	2690	2120	5840	0.4	2100	1790	6710	0.4	2520	2040
16-#11	21	5880	0.5	1850	1550	6770	0.5	2240	1770	5660	0.5	1750	1490	6470	0.5	2100	1700
6x-4y	25	5670	0.7	1110	929	6490	0.7	1340	1060	5450	0.7	1050	895	6200	0.7	1260	1020
	40	4680	0.9	369	309	5180	0.9	447	353	4470	0.9	349	298	4920	0.9	420	339
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1600	1600	8.40	8.40	1600	1600	8.40	8.40	1490	1490	8.40	8.40	1490	1490	8.40	8.40
3.98 %	0	6610	0.0	3480	3060	7700	0.0	4170	3450	6390	0.0	3300	2960	7390	0.0	3930	3320
Ar(in²)	11	6450	0.2	3130	2750	7480	0.2	3750	3100	6230	0.2	2970	2660	7170	0.2	3540	2990
=31.20	13	6390	0.3	2740	2410	7390	0.3	3280	2710	6170	0.3	2600	2330	7090	0.3	3090	2620
	17	6230	0.4	2350	2060	7190	0.4	2810	2330	6020	0.4	2230	2000	6880	0.4	2650	2240
20-#11	21	6040	0.5	1960	1720	6930	0.5	2340	1940	5820	0.5	1860	1660	6630	0.5	2210	1870
6x-6y	25	5820	0.7	1170	1030	6640	0.7	1410	1160	5600	0.7	1110	998	6340	0.7	1330	1120
	40	4770	0.9	391	344	5270	0.9	468	387	4560	0.9	371	332	5000	0.9	441	373
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1600	1600	8.40	8.40	1600	1600	8.40	8.40	1490	1490	8.40	8.40	1490	1490	8.40	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 28

Designation		W 14 x257								W 14 x233							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.51 %	0	5330	0.0	2000	1810	6230	0.0	2560	2160	5140	0.0	1850	1720	5960	0.0	2360	2050
Ar(in²)	11	5210	0.2	1800	1630	6070	0.2	2310	1950	5020	0.2	1660	1550	5800	0.2	2120	1840
= 4.00	13	5160	0.3	1570	1430	6000	0.3	2020	1700	4980	0.3	1450	1350	5730	0.3	1850	1610
	17	5050	0.4	1350	1220	5850	0.4	1730	1460	4860	0.4	1250	1160	5580	0.4	1590	1380
4-# 9	21	4910	0.5	1120	1020	5650	0.5	1440	1220	4720	0.5	1040	966	5390	0.5	1320	1150
2x-2y	25	4740	0.7	673	612	5430	0.7	864	729	4550	0.7	622	580	5170	0.7	794	690
	40	3950	0.9	224	204	4380	0.9	288	243	3770	0.9	207	193	4150	0.9	264	230
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1400	1400	8.40	8.40	1400	1400	8.40	8.40	1300	1300	8.40	8.40	1300	1300	8.40	8.40
1.02 %	0	5460	0.0	2200	1950	6360	0.0	2770	2290	5270	0.0	2050	1850	6080	0.0	2560	2180
Ar(in²)	11	5330	0.2	1980	1750	6190	0.2	2490	2060	5140	0.2	1840	1670	5920	0.2	2300	1960
= 8.00	13	5280	0.3	1730	1530	6120	0.3	2180	1810	5090	0.3	1610	1460	5850	0.3	2010	1720
	17	5160	0.4	1480	1310	5960	0.4	1870	1550	4970	0.4	1380	1250	5690	0.4	1730	1470
8-# 9	21	5010	0.5	1240	1100	5760	0.5	1560	1290	4820	0.5	1150	1040	5500	0.5	1440	1230
4x-2y	25	4840	0.7	742	657	5520	0.7	933	774	4650	0.7	691	625	5270	0.7	863	735
	40	4010	0.9	247	219	4440	0.9	311	258	3830	0.9	230	208	4210	0.9	287	245
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1390	1390	8.40	8.40	1390	1390	8.40	8.40	1300	1300	8.40	8.40	1300	1300	8.40	8.40
2.04 %	0	5710	0.0	2560	2370	6610	0.0	3130	2710	5520	0.0	2410	2270	6340	0.0	2920	2600
Ar(in²)	11	5570	0.2	2300	2130	6420	0.2	2810	2440	5380	0.2	2170	2050	6150	0.2	2630	2340
=16.00	13	5520	0.3	2020	1870	6350	0.3	2460	2140	5330	0.3	1900	1790	6080	0.3	2300	2050
	17	5390	0.4	1730	1600	6180	0.4	2110	1830	5200	0.4	1630	1540	5910	0.4	1970	1750
4-#18	21	5220	0.5	1440	1330	5960	0.5	1760	1530	5030	0.5	1350	1280	5700	0.5	1640	1460
2x-2y	25	5030	0.7	863	799	5710	0.7	1050	915	4840	0.7	812	767	5450	0.7	984	876
	40	4130	0.9	287	266	4550	0.9	351	305	3950	0.9	270	255	4310	0.9	328	292
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1390	1390	8.40	8.40	1390	1390	8.40	8.40	1290	1290	8.40	8.40	1290	1290	8.40	8.40
3.18 %	0	5990	0.0	2940	2560	6890	0.0	3510	2900	5800	0.0	2790	2460	6620	0.0	3300	2780
Ar(in²)	11	5840	0.2	2650	2300	6690	0.2	3160	2610	5650	0.2	2510	2220	6420	0.2	2970	2510
=24.96	13	5780	0.3	2320	2010	6610	0.3	2760	2280	5590	0.3	2200	1940	6340	0.3	2600	2190
	17	5640	0.4	1990	1730	6420	0.4	2370	1960	5440	0.4	1880	1660	6150	0.4	2230	1880
16-#11	21	5460	0.5	1650	1440	6190	0.5	1970	1630	5260	0.5	1570	1390	5920	0.5	1860	1570
6x-4y	25	5250	0.7	992	862	5910	0.7	1180	978	5050	0.7	941	831	5650	0.7	1110	939
	40	4260	0.9	330	287	4660	0.9	394	326	4070	0.9	313	277	4420	0.9	371	313
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1390	1390	8.40	8.40	1390	1390	8.40	8.40	1290	1290	8.40	8.40	1290	1290	8.40	8.40
3.98 %	0	6190	0.0	3130	2860	7090	0.0	3700	3200	6000	0.0	2980	2770	6820	0.0	3490	3090
Ar(in²)	11	6030	0.2	2820	2580	6880	0.2	3330	2880	5840	0.2	2680	2490	6610	0.2	3150	2780
=31.20	13	5960	0.3	2470	2250	6790	0.3	2920	2520	5770	0.3	2350	2180	6520	0.3	2750	2430
	17	5810	0.4	2110	1930	6590	0.4	2500	2160	5620	0.4	2010	1870	6320	0.4	2360	2090
20-#11	21	5620	0.5	1760	1610	6340	0.5	2080	1800	5420	0.5	1680	1560	6080	0.5	1970	1740
6x-6y	25	5390	0.7	1060	965	6060	0.7	1250	1080	5200	0.7	1010	934	5790	0.7	1180	1040
	40	4350	0.9	352	321	4740	0.9	416	360	4160	0.9	335	311	4490	0.9	393	347
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1380	1380	8.40	8.40	1380	1380	8.40	8.40	1290	1290	8.40	8.40	1290	1290	8.40	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 8.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 28 x 28

Designation		W 14 x211								W 14 x193							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.51 %	0	4970	0.0	1710	1630	5710	0.0	2170	1940	4830	0.0	1600	1550	5510	0.0	2020	1850
Ar(in²)	11	4850	0.2	1540	1470	5550	0.2	1950	1740	4710	0.2	1440	1400	5350	0.2	1820	1660
= 4.00	13	4800	0.3	1350	1280	5490	0.3	1710	1530	4660	0.3	1260	1220	5290	0.3	1590	1460
	17	4690	0.4	1150	1100	5340	0.4	1460	1310	4550	0.4	1080	1050	5140	0.4	1360	1250
4-# 9	21	4550	0.5	961	915	5150	0.5	1220	1090	4410	0.5	902	872	4960	0.5	1140	1040
2x-2y	25	4380	0.7	577	549	4940	0.7	731	654	4240	0.7	541	523	4750	0.7	682	623
	40	3600	0.9	192	183	3940	0.9	243	218	3460	0.9	180	174	3770	0.9	227	207
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1210	1210	8.40	8.40	1210	1210	8.40	8.40	1140	1140	8.40	8.40	1140	1140	8.40	8.40
1.02 %	0	5100	0.0	1910	1760	5830	0.0	2370	2070	4960	0.0	1810	1690	5630	0.0	2220	1980
Ar(in²)	11	4970	0.2	1720	1590	5670	0.2	2130	1860	4830	0.2	1630	1520	5470	0.2	2000	1780
= 8.00	13	4920	0.3	1510	1390	5600	0.3	1870	1630	4780	0.3	1420	1330	5410	0.3	1750	1560
	17	4800	0.4	1290	1190	5450	0.4	1600	1400	4660	0.4	1220	1140	5250	0.4	1500	1340
8-# 9	21	4650	0.5	1080	991	5250	0.5	1330	1160	4510	0.5	1020	948	5060	0.5	1250	1110
4x-2y	25	4480	0.7	645	594	5030	0.7	800	698	4340	0.7	609	569	4840	0.7	750	668
	40	3660	0.9	215	198	3990	0.9	266	232	3520	0.9	203	189	3820	0.9	250	222
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1210	1210	8.40	8.40	1210	1210	8.40	8.40	1140	1140	8.40	8.40	1140	1140	8.40	8.40
2.04 %	0	5350	0.0	2270	2180	6090	0.0	2730	2490	5210	0.0	2170	2110	5890	0.0	2580	2400
Ar(in²)	11	5210	0.2	2050	1970	5910	0.2	2460	2240	5070	0.2	1950	1900	5710	0.2	2330	2160
=16.00	13	5160	0.3	1790	1720	5840	0.3	2150	1960	5020	0.3	1710	1660	5640	0.3	2030	1890
	17	5020	0.4	1530	1470	5670	0.4	1840	1680	4880	0.4	1460	1420	5470	0.4	1740	1620
4-#18	21	4860	0.5	1280	1230	5460	0.5	1540	1400	4720	0.5	1220	1190	5260	0.5	1450	1350
2x-2y	25	4670	0.7	767	737	5210	0.7	921	840	4530	0.7	731	712	5020	0.7	872	810
	40	3770	0.9	255	245	4090	0.9	307	280	3630	0.9	243	237	3910	0.9	290	270
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1210	1210	8.40	8.40	1210	1210	8.40	8.40	1140	1140	8.40	8.40	1140	1140	8.40	8.40
3.18 %	0	5630	0.0	2660	2370	6370	0.0	3110	2680	5490	0.0	2550	2300	6170	0.0	2970	2590
Ar(in²)	11	5480	0.2	2390	2140	6170	0.2	2800	2410	5340	0.2	2290	2070	5970	0.2	2670	2330
=24.96	13	5420	0.3	2090	1870	6100	0.3	2450	2110	5280	0.3	2010	1810	5900	0.3	2340	2040
	17	5270	0.4	1790	1600	5910	0.4	2100	1810	5130	0.4	1720	1550	5710	0.4	2000	1750
16-#11	21	5090	0.5	1490	1330	5680	0.5	1750	1510	4940	0.5	1430	1290	5480	0.5	1670	1460
6x-4y	25	4880	0.7	896	800	5410	0.7	1050	903	4730	0.7	860	775	5220	0.7	1000	873
	40	3890	0.9	298	266	4200	0.9	350	301	3750	0.9	286	258	4020	0.9	333	291
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1200	1200	8.40	8.40	1200	1200	8.40	8.40	1130	1130	8.40	8.40	1130	1130	8.40	8.40
3.98 %	0	5830	0.0	2850	2680	6570	0.0	3300	2980	5690	0.0	2740	2610	6370	0.0	3160	2890
Ar(in²)	11	5660	0.2	2560	2410	6360	0.2	2970	2680	5520	0.2	2470	2340	6160	0.2	2840	2600
=31.20	13	5600	0.3	2240	2110	6270	0.3	2600	2350	5460	0.3	2160	2050	6080	0.3	2480	2280
	17	5440	0.4	1920	1810	6080	0.4	2230	2010	5300	0.4	1850	1760	5880	0.4	2130	1950
20-#11	21	5250	0.5	1600	1510	5830	0.5	1860	1680	5100	0.5	1540	1470	5630	0.5	1770	1630
6x-6y	25	5020	0.7	960	904	5550	0.7	1120	1010	4870	0.7	924	879	5350	0.7	1060	976
	40	3980	0.9	320	301	4270	0.9	371	335	3830	0.9	308	293	4080	0.9	354	325
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1200	1200	8.40	8.40	1200	1200	8.40	8.40	1130	1130	8.40	8.40	1130	1130	8.40	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 28 x 28

Designation		W 14 x176								W 14 x159							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.51 %	0	4700	0.0	1500	1480	5320	0.0	1880	1760	4560	0.0	1400	1390	5120	0.0	1740	1660
Ar(in^2)	11	4580	0.2	1350	1330	5160	0.2	1690	1580	4440	0.2	1260	1250	4970	0.2	1570	1500
= 4.00	13	4530	0.3	1180	1160	5100	0.3	1480	1380	4390	0.3	1100	1100	4910	0.3	1370	1310
	17	4420	0.4	1010	996	4950	0.4	1270	1190	4280	0.4	945	941	4760	0.4	1180	1120
4-# 9	21	4270	0.5	844	830	4770	0.5	1060	988	4140	0.5	787	784	4580	0.5	979	935
2x-2y	25	4110	0.7	506	498	4560	0.7	634	593	3970	0.7	472	470	4380	0.7	587	561
	40	3330	0.9	168	166	3600	0.9	211	197	3190	0.9	157	156	3430	0.9	195	187
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1070	1070	8.40	8.40	1070	1070	8.40	8.40	1010	1010	8.40	8.40	1010	1010	8.40	8.40
1.02 %	0	4830	0.0	1700	1610	5440	0.0	2080	1890	4690	0.0	1600	1530	5250	0.0	1950	1800
Ar(in^2)	11	4700	0.2	1530	1450	5280	0.2	1880	1700	4560	0.2	1440	1380	5080	0.2	1750	1620
= 8.00	13	4650	0.3	1340	1270	5220	0.3	1640	1490	4510	0.3	1260	1210	5020	0.3	1530	1420
	17	4530	0.4	1150	1090	5060	0.4	1410	1280	4390	0.4	1080	1030	4870	0.4	1310	1210
8-# 9	21	4380	0.5	958	907	4870	0.5	1170	1060	4240	0.5	902	861	4680	0.5	1090	1010
4x-2y	25	4200	0.7	575	544	4660	0.7	703	638	4060	0.7	541	516	4470	0.7	656	606
	40	3390	0.9	191	181	3650	0.9	234	212	3250	0.9	180	172	3470	0.9	218	202
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1070	1070	8.40	8.40	1070	1070	8.40	8.40	1000	1000	8.40	8.40	1000	1000	8.40	8.40
2.04 %	0	5080	0.0	2070	2030	5690	0.0	2440	2310	4940	0.0	1960	1950	5500	0.0	2300	2220
Ar(in^2)	11	4940	0.2	1860	1830	5520	0.2	2200	2080	4800	0.2	1770	1760	5320	0.2	2070	2000
=16.00	13	4880	0.3	1630	1600	5450	0.3	1920	1820	4740	0.3	1550	1540	5250	0.3	1810	1750
	17	4750	0.4	1390	1370	5280	0.4	1650	1560	4610	0.4	1330	1320	5080	0.4	1560	1500
4-#18	21	4580	0.5	1160	1140	5070	0.5	1370	1300	4440	0.5	1100	1100	4880	0.5	1300	1250
2x-2y	25	4390	0.7	696	686	4830	0.7	824	780	4250	0.7	662	659	4640	0.7	777	749
	40	3490	0.9	232	228	3740	0.9	274	260	3350	0.9	220	219	3560	0.9	259	249
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1070	1070	8.40	8.40	1070	1070	8.40	8.40	999	999	8.40	8.40	999	999	8.40	8.40
3.18 %	0	5360	0.0	2450	2220	5980	0.0	2830	2500	5230	0.0	2350	2150	5780	0.0	2690	2410
Ar(in^2)	11	5200	0.2	2200	2000	5780	0.2	2540	2250	5070	0.2	2110	1940	5590	0.2	2420	2170
=24.96	13	5140	0.3	1930	1750	5710	0.3	2220	1970	5000	0.3	1850	1690	5510	0.3	2120	1900
	17	4990	0.4	1650	1500	5520	0.4	1910	1690	4850	0.4	1580	1450	5320	0.4	1810	1620
16-#11	21	4810	0.5	1380	1250	5290	0.5	1590	1410	4660	0.5	1320	1210	5100	0.5	1510	1350
6x-4y	25	4590	0.7	825	750	5030	0.7	953	843	4450	0.7	791	726	4840	0.7	906	812
	40	3610	0.9	275	250	3840	0.9	317	281	3460	0.9	263	242	3660	0.9	302	270
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1060	1060	8.40	8.40	1060	1060	8.40	8.40	995	995	8.40	8.40	995	995	8.40	8.40
3.98 %	0	5560	0.0	2640	2530	6180	0.0	3010	2810	5420	0.0	2540	2460	5980	0.0	2870	2710
Ar(in^2)	11	5390	0.2	2370	2280	5960	0.2	2710	2530	5250	0.2	2290	2210	5770	0.2	2590	2440
=31.20	13	5320	0.3	2080	1990	5880	0.3	2370	2210	5180	0.3	2000	1940	5690	0.3	2260	2140
	17	5160	0.4	1780	1710	5680	0.4	2030	1890	5020	0.4	1710	1660	5490	0.4	1940	1830
20-#11	21	4960	0.5	1480	1420	5440	0.5	1690	1580	4820	0.5	1430	1380	5250	0.5	1620	1530
6x-6y	25	4730	0.7	890	854	5160	0.7	1020	946	4580	0.7	856	829	4970	0.7	969	915
	40	3680	0.9	296	284	3900	0.9	338	315	3530	0.9	285	276	3720	0.9	323	305
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1060	1060	8.40	8.40	1060	1060	8.40	8.40	992	992	8.40	8.40	992	992	8.40	8.40

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 28

Designation		W 14 x145								W 14 x132							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.51 %	0	4460	0.0	1320	1320	4970	0.0	1630	1580	4350	0.0	1240	1250	4820	0.0	1530	1490
Ar(in²)	11	4330	0.2	1190	1190	4810	0.2	1470	1420	4230	0.2	1120	1130	4660	0.2	1370	1340
= 4.00	13	4290	0.3	1040	1040	4750	0.3	1280	1250	4180	0.3	979	985	4610	0.3	1200	1180
	17	4170	0.4	891	894	4610	0.4	1100	1070	4060	0.4	839	844	4460	0.4	1030	1010
4-# 9	21	4030	0.5	742	745	4430	0.5	917	890	3920	0.5	699	703	4290	0.5	858	839
2x-2y	25	3860	0.7	445	447	4230	0.7	550	534	3750	0.7	419	422	4080	0.7	515	503
	40	3080	0.9	148	149	3290	0.9	183	178	2970	0.9	139	140	3160	0.9	171	167
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		951	951	8.40	8.40	951	951	8.40	8.40	898	898	8.40	8.40	898	898	8.40	8.40
1.02 %	0	4580	0.0	1520	1460	5090	0.0	1830	1720	4480	0.0	1450	1390	4940	0.0	1730	1630
Ar(in²)	11	4450	0.2	1370	1320	4930	0.2	1650	1550	4350	0.2	1300	1250	4780	0.2	1560	1460
= 8.00	13	4400	0.3	1200	1150	4870	0.3	1440	1350	4300	0.3	1140	1090	4720	0.3	1360	1280
	17	4280	0.4	1030	986	4720	0.4	1240	1160	4170	0.4	977	937	4570	0.4	1170	1100
8-# 9	21	4130	0.5	856	822	4530	0.5	1030	965	4020	0.5	814	780	4380	0.5	973	914
4x-2y	25	3950	0.7	514	493	4320	0.7	618	579	3840	0.7	488	468	4170	0.7	583	548
	40	3130	0.9	171	164	3340	0.9	206	193	3020	0.9	162	156	3200	0.9	194	182
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		949	949	8.40	8.40	949	949	8.40	8.40	896	896	8.40	8.40	896	896	8.40	8.40
2.04 %	0	4840	0.0	1880	1890	5350	0.0	2190	2140	4730	0.0	1810	1810	5200	0.0	2090	2050
Ar(in²)	11	4690	0.2	1700	1700	5170	0.2	1970	1930	4590	0.2	1630	1630	5020	0.2	1880	1850
=16.00	13	4640	0.3	1480	1480	5100	0.3	1730	1690	4530	0.3	1420	1430	4950	0.3	1650	1610
	17	4500	0.4	1270	1270	4930	0.4	1480	1440	4390	0.4	1220	1220	4780	0.4	1410	1380
4-#18	21	4330	0.5	1060	1060	4730	0.5	1230	1200	4220	0.5	1020	1020	4580	0.5	1180	1150
2x-2y	25	4130	0.7	635	636	4490	0.7	740	722	4020	0.7	610	612	4340	0.7	705	691
	40	3230	0.9	211	212	3420	0.9	246	240	3120	0.9	203	204	3280	0.9	235	230
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		945	945	8.40	8.40	945	945	8.40	8.40	892	892	8.40	8.40	892	892	8.40	8.40
3.18 %	0	5120	0.0	2270	2100	5630	0.0	2580	2330	5020	0.0	2190	2030	5480	0.0	2470	2240
Ar(in²)	11	4960	0.2	2040	1890	5430	0.2	2320	2100	4850	0.2	1970	1830	5280	0.2	2220	2020
=24.96	13	4890	0.3	1780	1650	5360	0.3	2030	1830	4790	0.3	1720	1600	5200	0.3	1950	1760
	17	4740	0.4	1530	1420	5170	0.4	1740	1570	4630	0.4	1480	1370	5020	0.4	1670	1510
16-#11	21	4550	0.5	1270	1180	4940	0.5	1450	1310	4440	0.5	1230	1140	4790	0.5	1390	1260
6x-4y	25	4330	0.7	764	707	4680	0.7	869	785	4220	0.7	739	686	4530	0.7	834	755
	40	3340	0.9	254	235	3510	0.9	289	261	3210	0.9	246	228	3370	0.9	278	251
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		941	941	8.40	8.40	941	941	8.40	8.40	888	888	8.40	8.40	888	888	8.40	8.40
3.98 %	0	5320	0.0	2460	2400	5830	0.0	2760	2640	5210	0.0	2380	2340	5680	0.0	2660	2550
Ar(in²)	11	5140	0.2	2210	2160	5610	0.2	2490	2370	5030	0.2	2150	2110	5460	0.2	2390	2290
=31.20	13	5070	0.3	1940	1890	5530	0.3	2180	2080	4960	0.3	1880	1840	5380	0.3	2090	2010
	17	4910	0.4	1660	1620	5330	0.4	1860	1780	4790	0.4	1610	1580	5180	0.4	1790	1720
20-#11	21	4700	0.5	1380	1350	5090	0.5	1550	1480	4590	0.5	1340	1320	4940	0.5	1500	1430
6x-6y	25	4470	0.7	829	811	4810	0.7	932	889	4350	0.7	804	789	4660	0.7	897	859
	40	3400	0.9	276	270	3570	0.9	310	296	3280	0.9	268	263	3420	0.9	299	286
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		938	938	8.40	8.40	938	938	8.40	8.40	885	885	8.40	8.40	885	885	8.40	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 8.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 28 x 28

Designation		W 14 x120								W 14 x109							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.51 %	0	4260	0.0	1180	1190	4680	0.0	1430	1420	4170	0.0	1110	1130	4550	0.0	1350	1350
Ar(in²)	11	4140	0.2	1060	1070	4530	0.2	1290	1280	4050	0.2	1000	1010	4400	0.2	1210	1210
= 4.00	13	4090	0.3	926	936	4470	0.3	1130	1120	4000	0.3	876	886	4350	0.3	1060	1060
	17	3970	0.4	794	802	4330	0.4	967	957	3880	0.4	751	760	4200	0.4	908	908
4-# 9	21	3820	0.5	661	668	4150	0.5	806	798	3730	0.5	626	633	4030	0.5	757	757
2x-2y	25	3650	0.7	397	401	3950	0.7	483	478	3560	0.7	375	380	3830	0.7	454	454
	40	2870	0.9	132	133	3030	0.9	161	159	2780	0.9	125	126	2920	0.9	151	151
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		850	850	8.40	8.40	850	850	8.40	8.40	806	806	8.40	8.40	806	806	8.40	8.40
1.02 %	0	4390	0.0	1380	1330	4810	0.0	1640	1560	4300	0.0	1320	1260	4680	0.0	1550	1480
Ar(in²)	11	4250	0.2	1240	1190	4650	0.2	1470	1400	4170	0.2	1180	1140	4520	0.2	1390	1330
= 8.00	13	4200	0.3	1090	1040	4590	0.3	1290	1230	4110	0.3	1040	994	4460	0.3	1220	1170
	17	4080	0.4	931	894	4440	0.4	1100	1050	3990	0.4	888	852	4310	0.4	1050	1000
8-# 9	21	3920	0.5	776	745	4250	0.5	920	875	3830	0.5	740	710	4130	0.5	871	834
4x-2y	25	3740	0.7	465	447	4040	0.7	552	525	3650	0.7	444	426	3910	0.7	523	500
	40	2920	0.9	155	149	3080	0.9	184	175	2820	0.9	148	142	2960	0.9	174	166
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		848	848	8.40	8.40	848	848	8.40	8.40	804	804	8.40	8.40	804	804	8.40	8.40
2.04 %	0	4640	0.0	1740	1750	5060	0.0	2000	1980	4550	0.0	1680	1690	4930	0.0	1910	1910
Ar(in²)	11	4490	0.2	1570	1580	4880	0.2	1800	1780	4400	0.2	1510	1520	4760	0.2	1720	1720
=16.00	13	4430	0.3	1370	1380	4810	0.3	1570	1560	4340	0.3	1320	1330	4690	0.3	1500	1500
	17	4290	0.4	1170	1180	4650	0.4	1350	1340	4200	0.4	1130	1140	4520	0.4	1290	1290
4-#18	21	4120	0.5	978	985	4440	0.5	1120	1110	4020	0.5	943	950	4320	0.5	1070	1070
2x-2y	25	3920	0.7	587	591	4210	0.7	673	667	3820	0.7	566	570	4080	0.7	644	643
	40	3010	0.9	195	197	3160	0.9	224	222	2910	0.9	188	190	3040	0.9	214	214
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		845	845	8.40	8.40	845	845	8.40	8.40	800	800	8.40	8.40	800	800	8.40	8.40
3.18 %	0	4920	0.0	2120	1990	5340	0.0	2380	2170	4840	0.0	2060	1950	5220	0.0	2290	2110
Ar(in²)	11	4760	0.2	1910	1790	5150	0.2	2140	1950	4660	0.2	1850	1750	5020	0.2	2060	1890
=24.96	13	4690	0.3	1670	1570	5070	0.3	1870	1710	4600	0.3	1620	1530	4940	0.3	1800	1660
	17	4530	0.4	1430	1340	4880	0.4	1610	1460	4440	0.4	1390	1310	4750	0.4	1550	1420
16-#11	21	4340	0.5	1190	1120	4660	0.5	1340	1220	4240	0.5	1160	1100	4530	0.5	1290	1180
6x-4y	25	4110	0.7	716	671	4390	0.7	802	731	4010	0.7	694	657	4260	0.7	773	710
	40	3100	0.9	238	223	3240	0.9	267	243	3000	0.9	231	219	3110	0.9	257	236
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		840	840	8.40	8.40	840	840	8.40	8.40	796	796	8.40	8.40	796	796	8.40	8.40
3.98 %	0	5120	0.0	2320	2300	5540	0.0	2570	2470	5030	0.0	2250	2250	5410	0.0	2480	2410
Ar(in²)	11	4940	0.2	2090	2070	5330	0.2	2310	2230	4850	0.2	2030	2030	5200	0.2	2230	2170
=31.20	13	4870	0.3	1830	1810	5240	0.3	2020	1950	4770	0.3	1780	1770	5120	0.3	1950	1900
	17	4690	0.4	1560	1550	5040	0.4	1730	1670	4600	0.4	1520	1520	4910	0.4	1670	1630
20-#11	21	4480	0.5	1300	1290	4800	0.5	1440	1390	4390	0.5	1270	1270	4670	0.5	1400	1360
6x-6y	25	4240	0.7	782	774	4520	0.7	866	835	4140	0.7	760	760	4390	0.7	837	813
	40	3160	0.9	260	258	3290	0.9	288	278	3050	0.9	253	253	3160	0.9	279	271
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		837	837	8.40	8.40	837	837	8.40	8.40	793	793	8.40	8.40	793	793	8.40	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 28

Designation		W 12 x336								W 12 x305							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.51 %	0	5950	0.0	2410	1980	7120	0.0	3110	2330	5700	0.0	2220	1890	6770	0.0	2850	2210
Ar(in²)	11	5820	0.2	2170	1780	6950	0.2	2800	2090	5580	0.2	2000	1700	6600	0.2	2560	1990
= 4.00	13	5780	0.3	1900	1560	6880	0.3	2450	1830	5530	0.3	1750	1490	6530	0.3	2240	1740
	17	5660	0.4	1630	1340	6710	0.4	2100	1570	5420	0.4	1500	1270	6370	0.4	1920	1490
4-# 9	21	5510	0.5	1360	1120	6510	0.5	1750	1310	5270	0.5	1250	1060	6170	0.5	1600	1240
2x-2y	25	5340	0.7	814	669	6260	0.7	1050	785	5100	0.7	749	636	5930	0.7	960	745
	40	4520	0.9	271	223	5130	0.9	349	261	4300	0.9	249	212	4840	0.9	320	248
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1710	1710	8.40	8.40	1710	1710	8.40	8.40	1590	1590	8.40	8.40	1590	1590	8.40	8.40
1.02 %	0	6070	0.0	2610	2110	7250	0.0	3310	2460	5830	0.0	2420	2020	6890	0.0	3050	2340
Ar(in²)	11	5940	0.2	2350	1900	7070	0.2	2980	2210	5700	0.2	2180	1820	6720	0.2	2740	2110
= 8.00	13	5890	0.3	2060	1660	7000	0.3	2610	1940	5650	0.3	1910	1590	6650	0.3	2400	1840
	17	5770	0.4	1760	1430	6820	0.4	2240	1660	5530	0.4	1640	1360	6480	0.4	2060	1580
8-# 9	21	5620	0.5	1470	1190	6610	0.5	1860	1380	5380	0.5	1360	1140	6270	0.5	1710	1320
4x-2y	25	5440	0.7	882	713	6360	0.7	1120	829	5200	0.7	817	681	6030	0.7	1030	789
	40	4590	0.9	294	237	5190	0.9	372	276	4360	0.9	272	227	4890	0.9	342	263
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1710	1710	8.40	8.40	1710	1710	8.40	8.40	1580	1580	8.40	8.40	1580	1580	8.40	8.40
2.04 %	0	6320	0.0	2970	2530	7500	0.0	3670	2870	6080	0.0	2780	2440	7150	0.0	3410	2760
Ar(in²)	11	6190	0.2	2680	2280	7310	0.2	3300	2590	5940	0.2	2500	2190	6960	0.2	3070	2480
=16.00	13	6130	0.3	2340	1990	7230	0.3	2890	2260	5890	0.3	2190	1920	6880	0.3	2680	2170
	17	6000	0.4	2010	1710	7050	0.4	2480	1940	5760	0.4	1880	1650	6700	0.4	2300	1860
4-#18	21	5840	0.5	1670	1420	6820	0.5	2060	1620	5590	0.5	1560	1370	6480	0.5	1920	1550
2x-2y	25	5640	0.7	1000	854	6550	0.7	1240	969	5400	0.7	938	822	6220	0.7	1150	930
	40	4720	0.9	334	284	5300	0.9	412	323	4490	0.9	312	274	5010	0.9	383	310
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1710	1710	8.40	8.40	1710	1710	8.40	8.40	1580	1580	8.40	8.40	1580	1580	8.40	8.40
3.18 %	0	6610	0.0	3350	2720	7780	0.0	4050	3060	6360	0.0	3160	2620	7430	0.0	3790	2940
Ar(in²)	11	6460	0.2	3020	2450	7570	0.2	3650	2750	6210	0.2	2850	2360	7220	0.2	3410	2650
=24.96	13	6400	0.3	2640	2140	7490	0.3	3190	2410	6150	0.3	2490	2070	7140	0.3	2980	2320
	17	6250	0.4	2260	1840	7290	0.4	2730	2060	6010	0.4	2140	1770	6950	0.4	2560	1990
16-#11	21	6070	0.5	1890	1530	7050	0.5	2280	1720	5830	0.5	1780	1480	6710	0.5	2130	1660
6x-4y	25	5860	0.7	1130	917	6760	0.7	1370	1030	5620	0.7	1070	885	6430	0.7	1280	993
	40	4870	0.9	377	305	5430	0.9	455	344	4630	0.9	355	295	5130	0.9	426	331
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1700	1700	8.40	8.40	1700	1700	8.40	8.40	1580	1580	8.40	8.40	1580	1580	8.40	8.40
3.98 %	0	6810	0.0	3520	3020	7980	0.0	4200	3360	6560	0.0	3330	2930	7630	0.0	3950	3240
Ar(in²)	11	6640	0.2	3170	2720	7760	0.2	3780	3020	6400	0.2	3000	2640	7410	0.2	3560	2920
=31.20	13	6580	0.3	2770	2380	7680	0.3	3310	2650	6340	0.3	2620	2310	7330	0.3	3110	2550
	17	6430	0.4	2380	2040	7460	0.4	2840	2270	6180	0.4	2250	1980	7120	0.4	2670	2190
20-#11	21	6240	0.5	1980	1700	7210	0.5	2360	1890	5990	0.5	1870	1650	6870	0.5	2220	1820
6x-6y	25	6020	0.7	1190	1020	6910	0.7	1420	1130	5770	0.7	1120	988	6570	0.7	1330	1090
	40	4960	0.9	396	339	5510	0.9	472	378	4720	0.9	374	329	5210	0.9	444	364
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1700	1700	8.40	8.40	1700	1700	8.40	8.40	1570	1570	8.40	8.40	1570	1570	8.40	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 28

Designation		W 12 x279								W 12 x252							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.51 %	0	5500	0.0	2060	1800	6470	0.0	2620	2110	5290	0.0	1900	1720	6170	0.0	2410	2000
Ar(in²)	11	5380	0.2	1850	1620	6310	0.2	2360	1900	5170	0.2	1710	1540	6010	0.2	2170	1800
= 4.00	13	5330	0.3	1620	1420	6240	0.3	2070	1660	5120	0.3	1500	1350	5950	0.3	1900	1580
	17	5210	0.4	1390	1220	6080	0.4	1770	1420	5010	0.4	1280	1160	5790	0.4	1620	1350
4-# 9	21	5070	0.5	1160	1010	5890	0.5	1480	1190	4870	0.5	1070	964	5600	0.5	1350	1130
2x-2y	25	4900	0.7	695	608	5660	0.7	885	711	4700	0.7	642	578	5380	0.7	812	675
	40	4100	0.9	231	202	4590	0.9	295	237	3910	0.9	214	192	4340	0.9	270	225
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
a 15 in		1480	1480	8.40	8.40	1480	1480	8.40	8.40	1380	1380	8.40	8.40	1380	1380	8.40	8.40
1.02 %	0	5620	0.0	2260	1940	6600	0.0	2830	2240	5420	0.0	2100	1850	6300	0.0	2610	2130
Ar(in²)	11	5500	0.2	2040	1740	6430	0.2	2540	2010	5290	0.2	1890	1660	6130	0.2	2350	1920
= 8.00	13	5450	0.3	1780	1520	6360	0.3	2230	1760	5240	0.3	1660	1460	6060	0.3	2050	1680
	17	5330	0.4	1530	1310	6190	0.4	1910	1510	5120	0.4	1420	1250	5900	0.4	1760	1440
8-# 9	21	5180	0.5	1270	1090	5990	0.5	1590	1260	4970	0.5	1180	1040	5700	0.5	1470	1200
4x-2y	25	5000	0.7	763	653	5750	0.7	953	755	4800	0.7	710	623	5470	0.7	880	720
	40	4170	0.9	254	217	4640	0.9	317	251	3970	0.9	236	207	4390	0.9	293	240
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
a 15 in		1480	1480	8.40	8.40	1480	1480	8.40	8.40	1370	1370	8.40	8.40	1370	1370	8.40	8.40
2.04 %	0	5880	0.0	2620	2360	6850	0.0	3180	2660	5670	0.0	2460	2270	6550	0.0	2970	2550
Ar(in²)	11	5740	0.2	2360	2120	6660	0.2	2870	2390	5530	0.2	2220	2040	6370	0.2	2670	2300
=16.00	13	5690	0.3	2060	1850	6590	0.3	2510	2090	5480	0.3	1940	1790	6300	0.3	2340	2010
	17	5550	0.4	1770	1590	6410	0.4	2150	1790	5350	0.4	1660	1530	6120	0.4	2000	1720
4-#18	21	5390	0.5	1470	1320	6190	0.5	1790	1490	5180	0.5	1390	1280	5910	0.5	1670	1430
2x-2y	25	5200	0.7	884	794	5940	0.7	1070	896	4990	0.7	831	765	5660	0.7	1000	860
	40	4290	0.9	294	264	4750	0.9	358	298	4090	0.9	277	255	4500	0.9	333	286
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
a 18 in		1480	1480	8.40	8.40	1480	1480	8.40	8.40	1370	1370	8.40	8.40	1370	1370	8.40	8.40
3.18 %	0	6160	0.0	3000	2540	7130	0.0	3570	2840	5950	0.0	2840	2460	6830	0.0	3350	2740
Ar(in²)	11	6010	0.2	2700	2290	6930	0.2	3210	2560	5800	0.2	2560	2210	6630	0.2	3010	2460
=24.96	13	5950	0.3	2360	2000	6850	0.3	2810	2240	5740	0.3	2240	1930	6560	0.3	2640	2160
	17	5800	0.4	2030	1720	6660	0.4	2410	1920	5600	0.4	1920	1660	6370	0.4	2260	1850
16-#11	21	5620	0.5	1690	1430	6420	0.5	2010	1600	5420	0.5	1600	1380	6130	0.5	1880	1540
6x-4y	25	5420	0.7	1010	858	6150	0.7	1200	959	5210	0.7	960	828	5860	0.7	1130	924
	40	4430	0.9	337	286	4870	0.9	401	319	4220	0.9	320	276	4610	0.9	376	308
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
a 18 in		1470	1470	8.40	8.40	1470	1470	8.40	8.40	1370	1370	8.40	8.40	1370	1370	8.40	8.40
3.98 %	0	6360	0.0	3170	2850	7330	0.0	3740	3140	6150	0.0	3010	2760	7030	0.0	3520	3040
Ar(in²)	11	6200	0.2	2850	2560	7120	0.2	3360	2830	5990	0.2	2710	2480	6820	0.2	3170	2740
=31.20	13	6130	0.3	2500	2240	7030	0.3	2940	2480	5920	0.3	2370	2170	6740	0.3	2770	2390
	17	5980	0.4	2140	1920	6830	0.4	2520	2120	5770	0.4	2030	1860	6530	0.4	2380	2050
20-#11	21	5790	0.5	1780	1600	6580	0.5	2100	1770	5580	0.5	1700	1550	6290	0.5	1980	1710
6x-6y	25	5560	0.7	1070	960	6290	0.7	1260	1060	5350	0.7	1020	931	6000	0.7	1190	1030
	40	4520	0.9	356	320	4950	0.9	420	353	4310	0.9	339	310	4680	0.9	396	342
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
a 18 in		1470	1470	8.40	8.40	1470	1470	8.40	8.40	1360	1360	8.40	8.40	1360	1360	8.40	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 28

Designation		W 12 x230								W 12 x210							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.51 %	0	5120	0.0	1780	1640	5930	0.0	2240	1910	4960	0.0	1660	1570	5700	0.0	2080	1830
Ar(in²)	11	5000	0.2	1600	1480	5770	0.2	2010	1720	4840	0.2	1500	1410	5540	0.2	1870	1650
= 4.00	13	4950	0.3	1400	1290	5700	0.3	1760	1510	4800	0.3	1310	1230	5480	0.3	1640	1440
	17	4840	0.4	1200	1110	5550	0.4	1510	1290	4680	0.4	1120	1060	5330	0.4	1400	1240
4-# 9	21	4700	0.5	999	922	5360	0.5	1260	1080	4540	0.5	935	881	5150	0.5	1170	1030
2x-2y	25	4530	0.7	599	553	5140	0.7	754	646	4380	0.7	561	529	4930	0.7	701	617
	40	3750	0.9	199	184	4130	0.9	251	215	3590	0.9	187	176	3930	0.9	233	205
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1290	1290	8.40	8.40	1290	1290	8.40	8.40	1210	1210	8.40	8.40	1210	1210	8.40	8.40
1.02 %	0	5250	0.0	1980	1770	6050	0.0	2440	2050	5090	0.0	1870	1700	5830	0.0	2280	1960
Ar(in²)	11	5120	0.2	1780	1600	5890	0.2	2190	1840	4960	0.2	1680	1530	5660	0.2	2050	1770
= 8.00	13	5070	0.3	1560	1400	5820	0.3	1920	1610	4920	0.3	1470	1340	5600	0.3	1800	1550
	17	4950	0.4	1340	1200	5660	0.4	1650	1380	4790	0.4	1260	1150	5440	0.4	1540	1330
8-# 9	21	4800	0.5	1110	997	5470	0.5	1370	1150	4650	0.5	1050	956	5250	0.5	1280	1100
4x-2y	25	4630	0.7	668	598	5240	0.7	822	690	4470	0.7	629	574	5020	0.7	769	662
	40	3810	0.9	222	199	4180	0.9	274	230	3650	0.9	209	191	3980	0.9	256	220
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1290	1290	8.40	8.40	1290	1290	8.40	8.40	1210	1210	8.40	8.40	1210	1210	8.40	8.40
2.04 %	0	5500	0.0	2340	2190	6310	0.0	2800	2460	5340	0.0	2220	2120	6080	0.0	2640	2380
Ar(in²)	11	5360	0.2	2100	1980	6120	0.2	2520	2220	5200	0.2	2000	1910	5900	0.2	2370	2140
=16.00	13	5310	0.3	1840	1730	6050	0.3	2200	1940	5150	0.3	1750	1670	5830	0.3	2080	1880
	17	5170	0.4	1580	1480	5880	0.4	1890	1660	5020	0.4	1500	1430	5660	0.4	1780	1610
4-#18	21	5010	0.5	1320	1230	5670	0.5	1570	1390	4850	0.5	1250	1190	5450	0.5	1480	1340
2x-2y	25	4820	0.7	789	740	5420	0.7	943	831	4660	0.7	750	716	5200	0.7	890	804
	40	3920	0.9	263	246	4280	0.9	314	277	3770	0.9	250	238	4080	0.9	296	268
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1280	1280	8.40	8.40	1280	1280	8.40	8.40	1200	1200	8.40	8.40	1200	1200	8.40	8.40
3.18 %	0	5780	0.0	2720	2380	6590	0.0	3180	2650	5630	0.0	2610	2310	6360	0.0	3020	2570
Ar(in²)	11	5630	0.2	2450	2140	6390	0.2	2860	2390	5470	0.2	2350	2080	6160	0.2	2720	2310
=24.96	13	5570	0.3	2140	1880	6310	0.3	2500	2090	5410	0.3	2050	1820	6090	0.3	2380	2020
	17	5420	0.4	1840	1610	6120	0.4	2140	1790	5260	0.4	1760	1560	5900	0.4	2040	1730
16-#11	21	5240	0.5	1530	1340	5890	0.5	1790	1490	5080	0.5	1470	1300	5670	0.5	1700	1440
6x-4y	25	5030	0.7	918	804	5620	0.7	1070	895	4870	0.7	879	779	5400	0.7	1020	866
	40	4050	0.9	306	268	4390	0.9	357	298	3890	0.9	293	259	4190	0.9	339	288
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1280	1280	8.40	8.40	1280	1280	8.40	8.40	1200	1200	8.40	8.40	1200	1200	8.40	8.40
3.98 %	0	5980	0.0	2890	2690	6790	0.0	3350	2960	5820	0.0	2780	2620	6560	0.0	3190	2870
Ar(in²)	11	5820	0.2	2600	2420	6570	0.2	3010	2660	5660	0.2	2500	2360	6350	0.2	2870	2590
=31.20	13	5750	0.3	2280	2120	6490	0.3	2640	2330	5590	0.3	2190	2060	6270	0.3	2510	2260
	17	5590	0.4	1950	1810	6290	0.4	2260	1990	5430	0.4	1880	1770	6070	0.4	2150	1940
20-#11	21	5400	0.5	1630	1510	6050	0.5	1880	1660	5240	0.5	1560	1470	5820	0.5	1790	1620
6x-6y	25	5180	0.7	975	907	5760	0.7	1130	997	5010	0.7	937	883	5540	0.7	1080	969
	40	4130	0.9	325	302	4460	0.9	376	332	3970	0.9	312	294	4260	0.9	358	323
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1280	1280	8.40	8.40	1280	1280	8.40	8.40	1200	1200	8.40	8.40	1200	1200	8.40	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) — Column Size(b x h): 28 x 28

Designation		W 12 x190								W 12 x170							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.51 %	0	4810	0.0	1550	1490	5470	0.0	1920	1740	4650	0.0	1440	1410	5250	0.0	1770	1650
Ar(in²)	11	4680	0.2	1400	1340	5310	0.2	1730	1570	4530	0.2	1300	1270	5090	0.2	1600	1490
= 4.00	13	4640	0.3	1220	1170	5250	0.3	1510	1370	4480	0.3	1130	1110	5030	0.3	1400	1300
	17	4520	0.4	1050	1010	5100	0.4	1300	1180	4370	0.4	972	952	4890	0.4	1200	1110
4-# 9	21	4380	0.5	871	838	4920	0.5	1080	980	4220	0.5	810	794	4710	0.5	997	928
2x-2y	25	4210	0.7	523	503	4710	0.7	649	588	4060	0.7	486	476	4500	0.7	598	557
	40	3440	0.9	174	167	3730	0.9	216	196	3280	0.9	162	158	3540	0.9	199	185
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1130	1130	8.40	8.40	1130	1130	8.40	8.40	1050	1050	8.40	8.40	1050	1050	8.40	8.40
1.02 %	0	4930	0.0	1750	1630	5600	0.0	2130	1880	4780	0.0	1640	1550	5370	0.0	1980	1780
Ar(in²)	11	4800	0.2	1580	1460	5430	0.2	1910	1690	4650	0.2	1480	1390	5210	0.2	1780	1610
= 8.00	13	4760	0.3	1380	1280	5370	0.3	1670	1480	4600	0.3	1290	1220	5150	0.3	1560	1410
	17	4630	0.4	1180	1100	5210	0.4	1440	1270	4480	0.4	1110	1040	4990	0.4	1330	1200
8-# 9	21	4480	0.5	985	914	5020	0.5	1200	1050	4330	0.5	924	870	4810	0.5	1110	1000
4x-2y	25	4310	0.7	591	548	4800	0.7	717	632	4150	0.7	554	522	4590	0.7	666	602
	40	3490	0.9	197	182	3780	0.9	239	210	3340	0.9	184	174	3590	0.9	222	200
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1130	1130	8.40	8.40	1130	1130	8.40	8.40	1050	1050	8.40	8.40	1050	1050	8.40	8.40
2.04 %	0	5180	0.0	2110	2050	5850	0.0	2480	2290	5030	0.0	2000	1970	5630	0.0	2330	2200
Ar(in²)	11	5040	0.2	1900	1840	5670	0.2	2240	2060	4890	0.2	1800	1770	5450	0.2	2100	1980
=16.00	13	4990	0.3	1660	1610	5600	0.3	1960	1810	4830	0.3	1580	1550	5380	0.3	1840	1740
	17	4850	0.4	1430	1380	5430	0.4	1680	1550	4700	0.4	1350	1330	5210	0.4	1580	1490
4-#18	21	4690	0.5	1190	1150	5220	0.5	1400	1290	4530	0.5	1130	1110	5000	0.5	1310	1240
2x-2y	25	4500	0.7	712	690	4980	0.7	838	774	4340	0.7	675	664	4770	0.7	787	744
	40	3600	0.9	237	230	3880	0.9	279	258	3440	0.9	225	221	3680	0.9	262	248
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1120	1120	8.40	8.40	1120	1120	8.40	8.40	1040	1040	8.40	8.40	1040	1040	8.40	8.40
3.18 %	0	5470	0.0	2490	2240	6130	0.0	2870	2480	5310	0.0	2380	2160	5910	0.0	2720	2390
Ar(in²)	11	5310	0.2	2240	2010	5930	0.2	2580	2230	5150	0.2	2150	1940	5710	0.2	2440	2150
=24.96	13	5250	0.3	1960	1760	5860	0.3	2260	1950	5090	0.3	1880	1700	5640	0.3	2140	1880
	17	5100	0.4	1680	1510	5670	0.4	1930	1680	4940	0.4	1610	1460	5450	0.4	1830	1610
16-#11	21	4920	0.5	1400	1260	5440	0.5	1610	1400	4760	0.5	1340	1210	5220	0.5	1530	1350
6x-4y	25	4700	0.7	841	754	5180	0.7	966	837	4540	0.7	804	728	4960	0.7	916	807
	40	3720	0.9	280	251	3980	0.9	322	279	3550	0.9	268	242	3780	0.9	305	269
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1120	1120	8.40	8.40	1120	1120	8.40	8.40	1040	1040	8.40	8.40	1040	1040	8.40	8.40
3.98 %	0	5670	0.0	2670	2540	6330	0.0	3030	2790	5510	0.0	2560	2470	6110	0.0	2880	2700
Ar(in²)	11	5500	0.2	2400	2290	6120	0.2	2730	2510	5340	0.2	2300	2220	5900	0.2	2590	2430
=31.20	13	5430	0.3	2100	2000	6040	0.3	2390	2190	5270	0.3	2010	1940	5810	0.3	2270	2120
	17	5270	0.4	1800	1720	5840	0.4	2050	1880	5110	0.4	1730	1660	5620	0.4	1940	1820
20-#11	21	5070	0.5	1500	1430	5600	0.5	1700	1570	4910	0.5	1440	1390	5370	0.5	1620	1520
6x-6y	25	4850	0.7	899	858	5320	0.7	1020	940	4680	0.7	863	832	5090	0.7	972	910
	40	3800	0.9	299	286	4050	0.9	340	313	3630	0.9	287	277	3840	0.9	324	303
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1120	1120	8.40	8.40	1120	1120	8.40	8.40	1040	1040	8.40	8.40	1040	1040	8.40	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 28

Designation		W 12 x152								W 12 x136							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.51 %	0	4510	0.0	1340	1340	5040	0.0	1640	1570	4380	0.0	1260	1260	4860	0.0	1520	1480
Ar(in²)	11	4390	0.2	1210	1200	4890	0.2	1480	1410	4260	0.2	1130	1140	4710	0.2	1370	1330
= 4.00	13	4340	0.3	1060	1050	4830	0.3	1290	1230	4210	0.3	988	994	4650	0.3	1200	1170
	17	4220	0.4	906	902	4690	0.4	1110	1060	4090	0.4	847	852	4500	0.4	1030	999
4-# 9	21	4080	0.5	755	751	4510	0.5	922	880	3950	0.5	706	710	4330	0.5	854	833
2x-2y	25	3910	0.7	453	451	4300	0.7	553	528	3780	0.7	423	426	4120	0.7	512	499
	40	3140	0.9	151	150	3360	0.9	184	176	3000	0.9	141	142	3190	0.9	170	166
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		978	978	8.40	8.40	978	978	8.40	8.40	913	913	8.40	8.40	913	913	8.40	8.40
1.02 %	0	4640	0.0	1550	1470	5170	0.0	1840	1700	4510	0.0	1460	1400	4980	0.0	1720	1620
Ar(in²)	11	4510	0.2	1390	1330	5010	0.2	1660	1530	4380	0.2	1310	1260	4820	0.2	1550	1450
= 8.00	13	4460	0.3	1220	1160	4950	0.3	1450	1340	4330	0.3	1150	1100	4760	0.3	1360	1270
	17	4330	0.4	1040	994	4790	0.4	1240	1150	4200	0.4	984	944	4610	0.4	1160	1090
8-# 9	21	4180	0.5	869	829	4610	0.5	1040	955	4050	0.5	820	787	4430	0.5	968	908
4x-2y	25	4010	0.7	521	497	4390	0.7	621	573	3870	0.7	492	472	4210	0.7	581	545
	40	3190	0.9	173	165	3410	0.9	207	191	3050	0.9	164	157	3240	0.9	193	181
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		976	976	8.40	8.40	976	976	8.40	8.40	911	911	8.40	8.40	911	911	8.40	8.40
2.04 %	0	4890	0.0	1910	1900	5420	0.0	2200	2120	4760	0.0	1820	1820	5240	0.0	2080	2040
Ar(in²)	11	4750	0.2	1720	1710	5240	0.2	1980	1910	4620	0.2	1640	1640	5060	0.2	1870	1830
=16.00	13	4690	0.3	1500	1490	5180	0.3	1730	1670	4560	0.3	1430	1440	4990	0.3	1640	1600
	17	4550	0.4	1290	1280	5010	0.4	1490	1430	4420	0.4	1230	1230	4820	0.4	1400	1370
4-#18	21	4380	0.5	1070	1070	4800	0.5	1240	1190	4250	0.5	1020	1030	4620	0.5	1170	1150
2x-2y	25	4190	0.7	643	639	4570	0.7	742	715	4050	0.7	613	615	4390	0.7	702	687
	40	3290	0.9	214	213	3490	0.9	247	238	3150	0.9	204	205	3320	0.9	234	229
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		972	972	8.40	8.40	972	972	8.40	8.40	907	907	8.40	8.40	907	907	8.40	8.40
3.18 %	0	5170	0.0	2290	2080	5710	0.0	2580	2310	5050	0.0	2200	2020	5520	0.0	2460	2230
Ar(in²)	11	5010	0.2	2060	1880	5510	0.2	2320	2080	4880	0.2	1980	1820	5320	0.2	2220	2000
=24.96	13	4950	0.3	1800	1640	5430	0.3	2030	1820	4820	0.3	1730	1590	5250	0.3	1940	1750
	17	4790	0.4	1540	1410	5250	0.4	1740	1560	4660	0.4	1480	1360	5060	0.4	1660	1500
16-#11	21	4610	0.5	1290	1170	5020	0.5	1450	1300	4470	0.5	1240	1140	4830	0.5	1390	1250
6x-4y	25	4390	0.7	771	703	4760	0.7	871	778	4250	0.7	742	681	4570	0.7	831	751
	40	3400	0.9	257	234	3590	0.9	290	259	3250	0.9	247	227	3410	0.9	277	250
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		968	968	8.40	8.40	968	968	8.40	8.40	903	903	8.40	8.40	903	903	8.40	8.40
3.98 %	0	5370	0.0	2460	2390	5900	0.0	2750	2610	5240	0.0	2380	2330	5720	0.0	2630	2530
Ar(in²)	11	5200	0.2	2220	2150	5690	0.2	2470	2350	5060	0.2	2140	2090	5510	0.2	2370	2280
=31.20	13	5130	0.3	1940	1880	5610	0.3	2170	2060	5000	0.3	1870	1830	5420	0.3	2070	1990
	17	4960	0.4	1660	1610	5410	0.4	1860	1760	4830	0.4	1600	1570	5220	0.4	1780	1710
20-#11	21	4760	0.5	1390	1350	5170	0.5	1550	1470	4620	0.5	1340	1310	4980	0.5	1480	1420
6x-6y	25	4530	0.7	831	807	4890	0.7	928	881	4380	0.7	802	784	4700	0.7	887	854
	40	3460	0.9	277	269	3650	0.9	309	293	3310	0.9	267	261	3470	0.9	295	284
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		965	965	8.40	8.40	965	965	8.40	8.40	900	900	8.40	8.40	900	900	8.40	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85　f'c : 8.0 ksi NW
φb = 0.90　Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)　Column Size(b x h): 28 x 28

Designation		W 12 x120								W							
Fy (ksi)		36				50											
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy								
.51 %	0	4260	0.0	1170	1190	4680	0.0	1410	1390								
Ar(in²)	11	4140	0.2	1060	1070	4530	0.2	1270	1250								
= 4.00	13	4090	0.3	924	934	4470	0.3	1110	1100								
	17	3970	0.4	792	800	4330	0.4	949	941								
4-# 9	21	3820	0.5	660	667	4150	0.5	790	784								
2x-2y	25	3650	0.7	396	400	3950	0.7	474	470								
	40	2870	0.9	132	133	3030	0.9	158	156								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		850	850	8.40	8.40	850	850	8.40	8.40								
1.02 %	0	4390	0.0	1380	1320	4810	0.0	1610	1530								
Ar(in²)	11	4250	0.2	1240	1190	4650	0.2	1450	1380								
= 8.00	13	4200	0.3	1080	1040	4590	0.3	1270	1200								
	17	4080	0.4	928	893	4440	0.4	1090	1030								
8-# 9	21	3920	0.5	774	744	4250	0.5	905	859								
4x-2y	25	3740	0.7	464	446	4040	0.7	543	515								
	40	2920	0.9	154	148	3080	0.9	181	171								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		848	848	8.40	8.40	848	848	8.40	8.40								
2.04 %	0	4640	0.0	1740	1750	5060	0.0	1970	1950								
Ar(in²)	11	4490	0.2	1560	1570	4880	0.2	1770	1760								
=16.00	13	4430	0.3	1370	1380	4810	0.3	1550	1540								
	17	4290	0.4	1170	1180	4650	0.4	1330	1320								
4-#18	21	4120	0.5	976	983	4440	0.5	1110	1100								
2x-2y	25	3920	0.7	585	589	4210	0.7	663	658								
	40	3010	0.9	195	196	3160	0.9	221	219								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		845	845	8.40	8.40	845	845	8.40	8.40								
3.18 %	0	4920	0.0	2120	1960	5340	0.0	2350	2140								
Ar(in²)	11	4760	0.2	1910	1770	5150	0.2	2110	1930								
=24.96	13	4690	0.3	1670	1550	5070	0.3	1850	1690								
	17	4530	0.4	1430	1320	4880	0.4	1590	1450								
16-#11	21	4340	0.5	1190	1100	4660	0.5	1320	1200								
6x-4y	25	4110	0.7	714	662	4390	0.7	792	722								
	40	3100	0.9	238	220	3240	0.9	264	240								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		840	840	8.40	8.40	840	840	8.40	8.40								
3.98 %	0	5120	0.0	2290	2270	5540	0.0	2520	2450								
Ar(in²)	11	4940	0.2	2070	2040	5330	0.2	2270	2200								
=31.20	13	4870	0.3	1810	1790	5240	0.3	1980	1930								
	17	4690	0.4	1550	1530	5040	0.4	1700	1650								
20-#11	21	4480	0.5	1290	1280	4800	0.5	1420	1380								
6x-6y	25	4240	0.7	774	765	4520	0.7	849	826								
	40	3160	0.9	258	255	3290	0.9	283	275								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		837	837	8.40	8.40	837	837	8.40	8.40								

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 28

Designation		W 14 x426								W 14 x398							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.47 %	0	6160	0.0	3010	2050	7640	0.0	3980	2530	5940	0.0	2820	1970	7340	0.0	3730	2410
Ar(in²)	11	6010	0.2	2710	1850	7410	0.2	3590	2270	5800	0.2	2540	1770	7110	0.2	3360	2170
= 3.16	13	5950	0.3	2370	1620	7320	0.3	3140	1990	5740	0.3	2220	1550	7020	0.3	2940	1900
	17	5800	0.4	2030	1390	7100	0.4	2690	1710	5600	0.4	1910	1330	6810	0.4	2520	1630
4-# 8	21	5620	0.5	1700	1150	6830	0.5	2240	1420	5420	0.5	1590	1110	6550	0.5	2100	1350
2x-2y	25	5420	0.7	1020	692	6520	0.7	1340	852	5220	0.7	953	663	6240	0.7	1260	812
	40	4440	0.9	339	230	5090	0.9	448	284	4250	0.9	317	221	4850	0.9	419	270
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2010	1480	8.40	7.20	2010	1480	8.40	7.20	1900	1400	8.40	7.20	1900	1400	8.40	7.20
.93 %	0	6250	0.0	3160	2170	7740	0.0	4130	2640	6040	0.0	2970	2080	7430	0.0	3880	2530
Ar(in²)	11	6100	0.2	2850	1950	7500	0.2	3720	2380	5890	0.2	2680	1870	7200	0.2	3490	2270
= 6.24	13	6040	0.3	2490	1710	7410	0.3	3250	2080	5830	0.3	2340	1640	7110	0.3	3050	1990
	17	5890	0.4	2130	1460	7190	0.4	2790	1790	5680	0.4	2010	1410	6890	0.4	2620	1700
4-#11	21	5700	0.5	1780	1220	6910	0.5	2320	1490	5500	0.5	1670	1170	6620	0.5	2180	1420
2x-2y	25	5490	0.7	1070	732	6590	0.7	1390	892	5290	0.7	1000	702	6310	0.7	1310	852
	40	4480	0.9	355	244	5120	0.9	464	297	4300	0.9	334	234	4890	0.9	436	284
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		2010	1480	8.40	7.20	2010	1480	8.40	7.20	1900	1400	8.40	7.20	1900	1400	8.40	7.20
1.86 %	0	6450	0.0	3470	2320	7940	0.0	4440	2800	6240	0.0	3280	2240	7630	0.0	4180	2680
Ar(in²)	11	6290	0.2	3120	2090	7690	0.2	3990	2520	6080	0.2	2950	2020	7390	0.2	3770	2410
=12.48	13	6220	0.3	2730	1830	7590	0.3	3500	2200	6010	0.3	2580	1760	7290	0.3	3290	2110
	17	6060	0.4	2340	1570	7350	0.4	3000	1890	5850	0.4	2220	1510	7060	0.4	2820	1810
8-#11	21	5870	0.5	1950	1310	7060	0.5	2500	1570	5660	0.5	1850	1260	6780	0.5	2350	1510
4x-2y	25	5640	0.7	1170	784	6730	0.7	1500	944	5440	0.7	1110	755	6450	0.7	1410	904
	40	4570	0.9	390	261	5200	0.9	499	314	4390	0.9	369	251	4960	0.9	470	301
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		2010	1480	8.40	7.20	2010	1480	8.40	7.20	1900	1400	8.40	7.20	1900	1400	8.40	7.20
2.79 %	0	6650	0.0	3690	2570	8140	0.0	4650	3050	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	6470	0.2	3320	2320	7870	0.2	4190	2740	0	0.2	0	0	0	0.2	0	0
=18.72	13	6400	0.3	2910	2030	7770	0.3	3660	2400	0	0.3	0	0	0	0.3	0	0
	17	6240	0.4	2490	1740	7520	0.4	3140	2060	0	0.4	0	0	0	0.4	0	0
12-#11	21	6030	0.5	2080	1450	7220	0.5	2620	1710	0	0.5	0	0	0	0.5	0	0
4x-4y	25	5790	0.7	1250	868	6860	0.7	1570	1030	0	0.7	0	0	0	0.7	0	0
	40	4660	0.9	415	289	5270	0.9	523	342	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		2010	1470	8.40	7.20	2010	1470	8.40	7.20	0	0	.00	.00	0	0	.00	.00
3.71 %	0	6850	0.0	3830	2820	8330	0.0	4770	3290	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	6660	0.2	3440	2540	8060	0.2	4290	2960	0	0.2	0	0	0	0.2	0	0
=24.96	13	6590	0.3	3010	2220	7950	0.3	3760	2590	0	0.3	0	0	0	0.3	0	0
	17	6410	0.4	2580	1900	7690	0.4	3220	2220	0	0.4	0	0	0	0.4	0	0
16-#11	21	6190	0.5	2150	1590	7370	0.5	2680	1850	0	0.5	0	0	0	0.5	0	0
4x-6y	25	5930	0.7	1290	951	7000	0.7	1610	1110	0	0.7	0	0	0	0.7	0	0
	40	4740	0.9	430	317	5330	0.9	536	370	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		2000	1470	8.40	7.20	2000	1470	8.40	7.20	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 28

Designation		W 14 x370								W 14 x342							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.47 %	0	5730	0.0	2640	1880	7030	0.0	3480	2290	5520	0.0	2450	1790	6720	0.0	3230	2180
Ar(in²)	11	5590	0.2	2370	1690	6810	0.2	3130	2060	5380	0.2	2210	1610	6510	0.2	2900	1960
= 3.16	13	5530	0.3	2080	1480	6720	0.3	2740	1810	5320	0.3	1930	1410	6430	0.3	2540	1720
	17	5390	0.4	1780	1270	6520	0.4	2350	1550	5180	0.4	1650	1210	6220	0.4	2180	1470
4-# 8	21	5220	0.5	1480	1060	6260	0.5	1960	1290	5010	0.5	1380	1000	5980	0.5	1820	1230
2x-2y	25	5020	0.7	890	633	5970	0.7	1170	773	4810	0.7	827	602	5690	0.7	1090	735
	40	4070	0.9	296	211	4620	0.9	391	257	3890	0.9	275	200	4390	0.9	363	245
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1800	1320	8.40	7.20	1800	1320	8.40	7.20	1690	1240	8.40	7.20	1690	1240	8.40	7.20
.93 %	0	5830	0.0	2790	2000	7130	0.0	3630	2410	5620	0.0	2600	1900	6820	0.0	3380	2300
Ar(in²)	11	5680	0.2	2510	1800	6900	0.2	3260	2170	5470	0.2	2340	1710	6600	0.2	3040	2070
= 6.24	13	5620	0.3	2190	1570	6810	0.3	2860	1900	5410	0.3	2050	1500	6510	0.3	2660	1810
	17	5470	0.4	1880	1350	6600	0.4	2450	1630	5270	0.4	1750	1290	6310	0.4	2280	1550
4-#11	21	5300	0.5	1570	1120	6340	0.5	2040	1360	5090	0.5	1460	1070	6050	0.5	1900	1290
2x-2y	25	5090	0.7	940	673	6030	0.7	1220	813	4890	0.7	877	642	5760	0.7	1140	774
	40	4110	0.9	313	224	4660	0.9	407	271	3930	0.9	292	214	4420	0.9	379	258
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1790	1320	8.40	7.20	1790	1320	8.40	7.20	1690	1240	8.40	7.20	1690	1240	8.40	7.20
1.86 %	0	6030	0.0	3100	2150	7320	0.0	3930	2560	5810	0.0	2910	2060	7020	0.0	3680	2450
Ar(in²)	11	5860	0.2	2790	1940	7090	0.2	3540	2310	5650	0.2	2620	1850	6780	0.2	3320	2210
=12.48	13	5800	0.3	2440	1690	6990	0.3	3100	2020	5590	0.3	2290	1620	6690	0.3	2900	1930
	17	5650	0.4	2090	1450	6770	0.4	2660	1730	5440	0.4	1960	1390	6470	0.4	2490	1650
8-#11	21	5460	0.5	1740	1210	6490	0.5	2210	1440	5250	0.5	1640	1160	6200	0.5	2070	1380
4x-2y	25	5230	0.7	1050	725	6170	0.7	1330	865	5030	0.7	982	695	5890	0.7	1240	827
	40	4200	0.9	348	241	4720	0.9	442	288	4010	0.9	327	231	4490	0.9	414	275
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1790	1320	8.40	7.20	1790	1320	8.40	7.20	1680	1240	8.40	7.20	1680	1240	8.40	7.20
2.68 %	0	6200	0.0	3360	2300	7500	0.0	4200	2700	5990	0.0	3170	2210	7190	0.0	3950	2590
Ar(in²)	11	6030	0.2	3020	2070	7250	0.2	3780	2430	5820	0.2	2860	1990	6950	0.2	3550	2330
=18.00	13	5960	0.3	2650	1810	7150	0.3	3300	2130	5750	0.3	2500	1740	6850	0.3	3110	2040
	17	5800	0.4	2270	1550	6910	0.4	2830	1830	5590	0.4	2140	1490	6620	0.4	2660	1750
8-#14	21	5600	0.5	1890	1290	6620	0.5	2360	1520	5390	0.5	1780	1240	6340	0.5	2220	1460
4x-2y	25	5360	0.7	1130	775	6290	0.7	1420	912	5160	0.7	1070	745	6010	0.7	1330	874
	40	4280	0.9	377	258	4780	0.9	472	304	4090	0.9	356	248	4540	0.9	443	291
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1790	1310	8.40	7.20	1790	1310	8.40	7.20	1680	1230	8.40	7.20	1680	1230	8.40	7.20
4.02 %	0	6490	0.0	3640	2650	7780	0.0	4480	3060	6270	0.0	3450	2560	7480	0.0	4230	2940
Ar(in²)	11	6300	0.2	3280	2380	7510	0.2	4030	2750	6090	0.2	3110	2310	7210	0.2	3800	2650
=27.00	13	6220	0.3	2870	2080	7410	0.3	3530	2410	6010	0.3	2720	2020	7110	0.3	3330	2320
	17	6050	0.4	2460	1790	7150	0.4	3020	2060	5840	0.4	2330	1730	6860	0.4	2850	1990
12-#14	21	5830	0.5	2050	1490	6840	0.5	2520	1720	5620	0.5	1940	1440	6550	0.5	2380	1660
4x-4y	25	5570	0.7	1230	892	6480	0.7	1510	1030	5360	0.7	1170	865	6200	0.7	1430	993
	40	4390	0.9	409	297	4880	0.9	503	343	4200	0.9	388	288	4630	0.9	475	331
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1780	1310	8.40	7.20	1780	1310	8.40	7.20	1680	1230	8.40	7.20	1680	1230	8.40	7.20

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 28

Designation		W 14 x311								W 14 x283							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.47 %	0	5270	0.0	2250	1680	6350	0.0	2950	2050	5050	0.0	2070	1590	6040	0.0	2700	1930
Ar(in²)	11	5120	0.2	2020	1520	6150	0.2	2650	1850	4910	0.2	1860	1430	5840	0.2	2430	1740
= 3.16	13	5070	0.3	1770	1330	6070	0.3	2320	1610	4860	0.3	1630	1250	5760	0.3	2130	1520
	17	4930	0.4	1520	1140	5870	0.4	1990	1380	4720	0.4	1400	1070	5570	0.4	1820	1300
4-# 8	21	4760	0.5	1270	947	5630	0.5	1660	1150	4560	0.5	1170	894	5340	0.5	1520	1090
2x-2y	25	4570	0.7	759	568	5360	0.7	995	692	4360	0.7	699	536	5070	0.7	910	652
	40	3660	0.9	253	189	4100	0.9	331	230	3470	0.9	233	178	3860	0.9	303	217
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1560	1140	8.40	7.20	1560	1140	8.40	7.20	1450	1060	8.40	7.20	1450	1060	8.40	7.20
.93 %	0	5360	0.0	2400	1800	6450	0.0	3100	2170	5150	0.0	2220	1710	6140	0.0	2850	2050
Ar(in²)	11	5220	0.2	2160	1620	6240	0.2	2790	1950	5000	0.2	2000	1540	5930	0.2	2560	1850
= 6.24	13	5160	0.3	1890	1420	6150	0.3	2440	1710	4940	0.3	1750	1350	5850	0.3	2240	1620
	17	5020	0.4	1620	1220	5950	0.4	2090	1460	4810	0.4	1500	1150	5650	0.4	1920	1380
4-#11	21	4840	0.5	1350	1010	5710	0.5	1740	1220	4630	0.5	1250	961	5420	0.5	1600	1150
2x-2y	25	4640	0.7	809	608	5420	0.7	1050	732	4440	0.7	749	577	5140	0.7	961	692
	40	3710	0.9	269	202	4140	0.9	348	244	3510	0.9	249	192	3890	0.9	320	230
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1560	1140	8.40	7.20	1560	1140	8.40	7.20	1450	1060	8.40	7.20	1450	1060	8.40	7.20
1.86 %	0	5560	0.0	2710	1960	6650	0.0	3410	2320	5350	0.0	2530	1870	6340	0.0	3160	2210
Ar(in²)	11	5400	0.2	2440	1760	6420	0.2	3070	2090	5190	0.2	2280	1680	6120	0.2	2840	1990
=12.48	13	5340	0.3	2130	1540	6330	0.3	2680	1830	5130	0.3	1990	1470	6030	0.3	2490	1740
	17	5190	0.4	1830	1320	6120	0.4	2300	1570	4980	0.4	1710	1260	5820	0.4	2130	1490
8-#11	21	5000	0.5	1520	1100	5860	0.5	1920	1310	4790	0.5	1420	1050	5570	0.5	1780	1240
4x-2y	25	4790	0.7	913	661	5560	0.7	1150	784	4580	0.7	853	630	5270	0.7	1070	744
	40	3790	0.9	304	220	4200	0.9	383	261	3590	0.9	284	210	3960	0.9	355	248
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1550	1140	8.40	7.20	1550	1140	8.40	7.20	1440	1060	8.40	7.20	1440	1060	8.40	7.20
2.68 %	0	5730	0.0	2970	2110	6820	0.0	3670	2470	5520	0.0	2790	2020	6510	0.0	3420	2350
Ar(in²)	11	5570	0.2	2670	1900	6580	0.2	3310	2220	5350	0.2	2510	1810	6280	0.2	3080	2110
=18.00	13	5500	0.3	2340	1660	6490	0.3	2890	1940	5290	0.3	2200	1590	6190	0.3	2700	1850
	17	5340	0.4	2010	1420	6270	0.4	2480	1660	5130	0.4	1890	1360	5970	0.4	2310	1580
8-#14	21	5140	0.5	1670	1190	5990	0.5	2070	1390	4930	0.5	1570	1130	5700	0.5	1930	1320
4x-2y	25	4910	0.7	1000	711	5670	0.7	1240	831	4700	0.7	942	680	5390	0.7	1160	792
	40	3860	0.9	334	237	4260	0.9	413	277	3660	0.9	314	226	4010	0.9	385	264
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1550	1140	8.40	7.20	1550	1140	8.40	7.20	1440	1060	8.40	7.20	1440	1060	8.40	7.20
4.02 %	0	6020	0.0	3250	2460	7110	0.0	3950	2820	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	5830	0.2	2930	2220	6850	0.2	3560	2540	0	0.2	0	0	0	0.2	0	0
=27.00	13	5760	0.3	2560	1940	6750	0.3	3110	2220	0	0.3	0	0	0	0.3	0	0
	17	5580	0.4	2190	1660	6500	0.4	2670	1900	0	0.4	0	0	0	0.4	0	0
12-#14	21	5370	0.5	1830	1390	6200	0.5	2220	1590	0	0.5	0	0	0	0.5	0	0
4x-4y	25	5110	0.7	1100	831	5860	0.7	1330	951	0	0.7	0	0	0	0.7	0	0
	40	3970	0.9	365	277	4340	0.9	444	317	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1550	1140	8.40	7.20	1550	1140	8.40	7.20	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 28

Designation		W 14 x257								W 14 x233							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.47 %	0	4850	0.0	1910	1500	5750	0.0	2470	1820	4660	0.0	1760	1410	5470	0.0	2260	1710
Ar(in²)	11	4710	0.2	1720	1350	5550	0.2	2220	1640	4520	0.2	1580	1270	5280	0.2	2040	1540
= 3.16	13	4650	0.3	1500	1180	5470	0.3	1950	1430	4470	0.3	1380	1110	5210	0.3	1780	1350
	17	4520	0.4	1290	1010	5290	0.4	1670	1230	4330	0.4	1190	955	5030	0.4	1530	1160
4-# 8	21	4360	0.5	1070	844	5060	0.5	1390	1020	4170	0.5	988	795	4810	0.5	1270	963
2x-2y	25	4170	0.7	643	506	4800	0.7	833	614	3980	0.7	592	477	4550	0.7	763	578
	40	3290	0.9	214	168	3630	0.9	277	204	3120	0.9	197	159	3420	0.9	254	192
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1340	987	8.40	7.20	1340	987	8.40	7.20	1250	916	8.40	7.20	1250	916	8.40	7.20
.93 %	0	4940	0.0	2060	1620	5840	0.0	2620	1940	4760	0.0	1910	1530	5570	0.0	2410	1830
Ar(in²)	11	4800	0.2	1850	1460	5640	0.2	2360	1740	4610	0.2	1720	1380	5370	0.2	2170	1650
= 6.24	13	4740	0.3	1620	1280	5560	0.3	2060	1530	4550	0.3	1500	1210	5300	0.3	1900	1440
	17	4600	0.4	1390	1090	5370	0.4	1770	1310	4420	0.4	1290	1040	5110	0.4	1630	1240
4-#11	21	4430	0.5	1160	911	5140	0.5	1470	1090	4250	0.5	1070	863	4880	0.5	1360	1030
2x-2y	25	4240	0.7	693	546	4870	0.7	884	654	4050	0.7	643	518	4620	0.7	813	618
	40	3330	0.9	231	182	3660	0.9	294	218	3160	0.9	214	172	3450	0.9	271	206
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1340	986	8.40	7.20	1340	986	8.40	7.20	1250	915	8.40	7.20	1250	915	8.40	7.20
1.86 %	0	5140	0.0	2370	1780	6040	0.0	2930	2100	4950	0.0	2220	1700	5770	0.0	2720	1990
Ar(in²)	11	4980	0.2	2130	1600	5820	0.2	2640	1890	4800	0.2	1990	1530	5560	0.2	2450	1790
=12.48	13	4920	0.3	1860	1400	5740	0.3	2310	1650	4730	0.3	1740	1340	5470	0.3	2140	1570
	17	4770	0.4	1600	1200	5540	0.4	1980	1410	4590	0.4	1500	1150	5270	0.4	1840	1340
8-#11	21	4590	0.5	1330	1000	5290	0.5	1650	1180	4400	0.5	1250	954	5030	0.5	1530	1120
4x-2y	25	4380	0.7	798	600	5000	0.7	988	707	4190	0.7	747	572	4750	0.7	918	671
	40	3410	0.9	266	200	3720	0.9	329	235	3230	0.9	249	190	3510	0.9	306	223
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1340	983	8.40	7.20	1340	983	8.40	7.20	1240	913	8.40	7.20	1240	913	8.40	7.20
2.68 %	0	5320	0.0	2630	1930	6220	0.0	3190	2240	5130	0.0	2480	1840	5940	0.0	2980	2140
Ar(in²)	11	5150	0.2	2370	1730	5990	0.2	2870	2020	4960	0.2	2230	1660	5720	0.2	2690	1920
=18.00	13	5080	0.3	2070	1520	5900	0.3	2510	1770	4890	0.3	1950	1450	5630	0.3	2350	1680
	17	4920	0.4	1770	1300	5680	0.4	2150	1510	4730	0.4	1670	1240	5420	0.4	2010	1440
8-#14	21	4730	0.5	1480	1080	5420	0.5	1800	1260	4540	0.5	1390	1040	5160	0.5	1680	1200
4x-2y	25	4500	0.7	887	649	5120	0.7	1080	757	4310	0.7	836	621	4860	0.7	1010	721
	40	3470	0.9	295	216	3770	0.9	359	252	3290	0.9	278	207	3560	0.9	335	240
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1340	981	8.40	7.20	1340	981	8.40	7.20	1240	911	8.40	7.20	1240	911	8.40	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 28

Designation		W 14 x211								W 14 x193							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.47 %	0	4490	0.0	1620	1330	5220	0.0	2080	1610	4350	0.0	1520	1270	5020	0.0	1930	1530
Ar(in²)	11	4350	0.2	1460	1200	5040	0.2	1870	1450	4210	0.2	1360	1140	4840	0.2	1740	1380
= 3.16	13	4290	0.3	1280	1050	4960	0.3	1640	1270	4160	0.3	1190	996	4770	0.3	1520	1210
	17	4160	0.4	1090	899	4790	0.4	1400	1090	4020	0.4	1020	854	4590	0.4	1300	1030
4-# 8	21	4000	0.5	912	749	4570	0.5	1170	907	3860	0.5	852	711	4380	0.5	1090	861
2x-2y	25	3810	0.7	547	449	4330	0.7	700	544	3680	0.7	511	427	4140	0.7	651	516
	40	2960	0.9	182	149	3220	0.9	233	181	2830	0.9	170	142	3060	0.9	217	172
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1160	851	8.40	7.20	1160	851	8.40	7.20	1090	800	8.40	7.20	1090	800	8.40	7.20
.93 %	0	4580	0.0	1770	1450	5320	0.0	2230	1730	4450	0.0	1660	1390	5120	0.0	2080	1650
Ar(in²)	11	4440	0.2	1590	1310	5130	0.2	2000	1560	4300	0.2	1500	1250	4930	0.2	1870	1490
= 6.24	13	4380	0.3	1390	1140	5050	0.3	1750	1360	4240	0.3	1310	1090	4860	0.3	1640	1300
	17	4250	0.4	1190	980	4870	0.4	1500	1170	4110	0.4	1120	935	4670	0.4	1400	1110
4-#11	21	4080	0.5	995	817	4650	0.5	1250	974	3940	0.5	936	779	4460	0.5	1170	928
2x-2y	25	3880	0.7	597	490	4390	0.7	750	584	3750	0.7	561	467	4200	0.7	701	557
	40	3000	0.9	199	163	3250	0.9	250	194	2870	0.9	187	155	3090	0.9	233	185
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1160	850	8.40	7.20	1160	850	8.40	7.20	1090	798	8.40	7.20	1090	798	8.40	7.20
1.86 %	0	4780	0.0	2080	1620	5520	0.0	2530	1890	4640	0.0	1970	1550	5320	0.0	2390	1810
Ar(in²)	11	4620	0.2	1870	1450	5310	0.2	2280	1700	4480	0.2	1780	1390	5110	0.2	2150	1630
=12.48	13	4560	0.3	1640	1270	5230	0.3	2000	1490	4420	0.3	1560	1220	5030	0.3	1880	1420
	17	4410	0.4	1400	1090	5030	0.4	1710	1280	4270	0.4	1330	1050	4840	0.4	1610	1220
8-#11	21	4230	0.5	1170	908	4790	0.5	1430	1060	4090	0.5	1110	870	4600	0.5	1340	1020
4x-2y	25	4020	0.7	702	545	4520	0.7	855	637	3880	0.7	666	522	4330	0.7	806	610
	40	3070	0.9	234	181	3310	0.9	285	212	2930	0.9	222	174	3140	0.9	268	203
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1150	848	8.40	7.20	1150	848	8.40	7.20	1080	796	8.40	7.20	1080	796	8.40	7.20
3.02 %	0	5030	0.0	2320	1940	5770	0.0	2780	2220	4890	0.0	2210	1880	5570	0.0	2630	2140
Ar(in²)	11	4850	0.2	2080	1750	5540	0.2	2500	2000	4710	0.2	1990	1690	5340	0.2	2370	1930
=20.32	13	4790	0.3	1820	1530	5450	0.3	2190	1750	4650	0.3	1740	1480	5250	0.3	2070	1690
	17	4620	0.4	1560	1310	5230	0.4	1870	1500	4480	0.4	1490	1270	5040	0.4	1770	1450
16-#10	21	4420	0.5	1300	1090	4970	0.5	1560	1250	4280	0.5	1240	1060	4780	0.5	1480	1200
4x-6y	25	4190	0.7	781	656	4670	0.7	937	749	4050	0.7	746	634	4490	0.7	887	722
	40	3150	0.9	260	218	3370	0.9	312	249	3010	0.9	248	211	3200	0.9	295	240
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1150	845	8.40	7.20	1150	845	8.40	7.20	1080	794	8.40	7.20	1080	794	8.40	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = $Pex(KxLx)^2/10000$. (kip-ft²), Cey = $Pey(KyLy)^2/10000$. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 8.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 28

Designation		W 14 x176								W 14 x159							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.47 %	0	4220	0.0	1410	1200	4830	0.0	1790	1450	4080	0.0	1310	1130	4640	0.0	1650	1360
Ar(in²)	11	4080	0.2	1270	1080	4650	0.2	1610	1300	3940	0.2	1180	1010	4460	0.2	1490	1230
= 3.16	13	4020	0.3	1110	943	4580	0.3	1410	1140	3890	0.3	1030	887	4390	0.3	1300	1070
	17	3890	0.4	954	808	4410	0.4	1210	978	3760	0.4	886	760	4220	0.4	1120	921
4-# 8	21	3730	0.5	795	674	4200	0.5	1010	815	3590	0.5	739	634	4010	0.5	929	767
2x-2y	25	3550	0.7	477	404	3960	0.7	604	489	3410	0.7	443	380	3780	0.7	557	460
	40	2710	0.9	159	134	2910	0.9	201	163	2580	0.9	147	126	2750	0.9	185	153
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1020	750	8.40	7.20	1020	750	8.40	7.20	952	699	8.40	7.20	952	699	8.40	7.20
.93 %	0	4310	0.0	1560	1320	4930	0.0	1940	1570	4180	0.0	1460	1250	4730	0.0	1800	1480
Ar(in²)	11	4170	0.2	1410	1190	4740	0.2	1740	1410	4030	0.2	1320	1120	4550	0.2	1620	1340
= 6.24	13	4110	0.3	1230	1040	4670	0.3	1530	1240	3970	0.3	1150	983	4470	0.3	1420	1170
	17	3970	0.4	1060	890	4490	0.4	1310	1060	3840	0.4	987	842	4300	0.4	1220	1000
4-#11	21	3810	0.5	879	741	4270	0.5	1090	882	3670	0.5	822	702	4090	0.5	1010	835
2x-2y	25	3610	0.7	527	445	4030	0.7	654	529	3480	0.7	493	421	3840	0.7	607	501
	40	2740	0.9	175	148	2940	0.9	218	176	2610	0.9	164	140	2780	0.9	202	167
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1020	749	8.40	7.20	1020	749	8.40	7.20	950	698	8.40	7.20	950	698	8.40	7.20
1.86 %	0	4510	0.0	1870	1480	5130	0.0	2250	1730	4370	0.0	1770	1410	4930	0.0	2110	1650
Ar(in²)	11	4350	0.2	1690	1330	4920	0.2	2020	1550	4210	0.2	1600	1270	4730	0.2	1900	1480
=12.48	13	4290	0.3	1480	1170	4840	0.3	1770	1360	4150	0.3	1400	1110	4650	0.3	1660	1300
	17	4140	0.4	1260	999	4650	0.4	1520	1170	4000	0.4	1200	952	4460	0.4	1420	1110
8-#11	21	3960	0.5	1050	832	4420	0.5	1260	971	3820	0.5	997	793	4230	0.5	1190	926
4x-2y	25	3750	0.7	632	499	4150	0.7	758	583	3610	0.7	598	476	3970	0.7	712	555
	40	2800	0.9	210	166	2990	0.9	252	194	2670	0.9	199	158	2820	0.9	237	185
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1020	747	8.40	7.20	1020	747	8.40	7.20	947	696	8.40	7.20	947	696	8.40	7.20
3.02 %	0	4760	0.0	2110	1810	5370	0.0	2490	2060	4620	0.0	2010	1740	5180	0.0	2340	1980
Ar(in²)	11	4580	0.2	1900	1630	5150	0.2	2240	1850	4440	0.2	1810	1570	4950	0.2	2110	1780
=20.32	13	4510	0.3	1660	1430	5060	0.3	1960	1620	4370	0.3	1580	1370	4870	0.3	1850	1560
	17	4340	0.4	1420	1220	4850	0.4	1680	1390	4200	0.4	1360	1180	4660	0.4	1580	1330
16-#10	21	4140	0.5	1190	1020	4590	0.5	1400	1160	4000	0.5	1130	980	4400	0.5	1320	1110
4x-6y	25	3910	0.7	712	611	4300	0.7	838	695	3770	0.7	678	588	4120	0.7	791	666
	40	2880	0.9	237	203	3040	0.9	279	231	2730	0.9	226	196	2880	0.9	263	222
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1010	744	8.40	7.20	1010	744	8.40	7.20	943	693	8.40	7.20	943	693	8.40	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 8.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 28

Designation		W 14 x145								W 14 x132							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.47 %	0	3970	0.0	1230	1070	4480	0.0	1540	1290	3870	0.0	1160	1000	4330	0.0	1440	1210
Ar(in²)	11	3830	0.2	1110	960	4300	0.2	1390	1160	3730	0.2	1040	901	4160	0.2	1290	1090
= 3.16	13	3780	0.3	971	840	4240	0.3	1210	1020	3670	0.3	911	788	4090	0.3	1130	951
	17	3650	0.4	832	720	4070	0.4	1040	873	3540	0.4	781	675	3920	0.4	970	815
4-# 8	21	3490	0.5	693	600	3870	0.5	866	727	3380	0.5	651	563	3720	0.5	808	679
2x-2y	25	3300	0.7	416	360	3640	0.7	520	436	3190	0.7	390	337	3500	0.7	485	407
	40	2470	0.9	138	120	2620	0.9	173	145	2370	0.9	130	112	2500	0.9	161	135
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		897	659	8.40	7.20	897	659	8.40	7.20	845	620	8.40	7.20	845	620	8.40	7.20
.93 %	0	4070	0.0	1380	1190	4580	0.0	1690	1410	3970	0.0	1310	1120	4430	0.0	1590	1330
Ar(in²)	11	3920	0.2	1240	1070	4390	0.2	1520	1270	3820	0.2	1180	1010	4250	0.2	1430	1200
= 6.24	13	3870	0.3	1090	935	4320	0.3	1330	1110	3760	0.3	1030	883	4170	0.3	1250	1050
	17	3730	0.4	933	802	4150	0.4	1140	954	3620	0.4	882	757	4000	0.4	1070	896
4-#11	21	3560	0.5	777	668	3940	0.5	950	795	3450	0.5	735	631	3790	0.5	892	747
2x-2y	25	3370	0.7	466	401	3700	0.7	570	477	3260	0.7	441	378	3560	0.7	535	448
	40	2500	0.9	155	133	2650	0.9	190	159	2400	0.9	147	126	2520	0.9	178	149
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		896	658	8.40	7.20	896	658	8.40	7.20	843	619	8.40	7.20	843	619	8.40	7.20
1.86 %	0	4270	0.0	1690	1350	4780	0.0	2000	1580	4170	0.0	1620	1280	4630	0.0	1900	1490
Ar(in²)	11	4110	0.2	1520	1220	4570	0.2	1800	1420	4000	0.2	1460	1160	4430	0.2	1710	1340
=12.48	13	4040	0.3	1330	1060	4500	0.3	1570	1240	3940	0.3	1270	1010	4350	0.3	1490	1170
	17	3890	0.4	1140	911	4310	0.4	1350	1060	3780	0.4	1090	867	4160	0.4	1280	1010
8-#11	21	3710	0.5	951	759	4080	0.5	1120	886	3600	0.5	909	722	3930	0.5	1070	838
4x-2y	25	3490	0.7	571	455	3820	0.7	674	531	3380	0.7	545	433	3670	0.7	639	503
	40	2560	0.9	190	151	2690	0.9	224	177	2450	0.9	181	144	2560	0.9	213	167
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		893	656	8.40	7.20	893	656	8.40	7.20	840	617	8.40	7.20	840	617	8.40	7.20
3.02 %	0	4520	0.0	1930	1680	5020	0.0	2230	1910	4410	0.0	1860	1620	4870	0.0	2130	1820
Ar(in²)	11	4330	0.2	1740	1520	4800	0.2	2010	1720	4230	0.2	1670	1460	4650	0.2	1920	1640
=20.32	13	4260	0.3	1520	1330	4710	0.3	1760	1500	4160	0.3	1460	1270	4560	0.3	1680	1430
	17	4090	0.4	1300	1140	4500	0.4	1510	1290	3980	0.4	1250	1090	4350	0.4	1440	1230
16-#10	21	3890	0.5	1090	947	4250	0.5	1260	1070	3780	0.5	1040	910	4100	0.5	1200	1020
4x-6y	25	3650	0.7	651	568	3970	0.7	753	643	3540	0.7	626	546	3820	0.7	719	614
	40	2620	0.9	217	189	2740	0.9	251	214	2510	0.9	208	182	2610	0.9	239	204
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		889	653	8.40	7.20	889	653	8.40	7.20	836	614	8.40	7.20	836	614	8.40	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 28

Designation		W 14 x120								W 14 x109							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.47 %	0	3780	0.0	1090	946	4200	0.0	1350	1140	3690	0.0	1030	893	4070	0.0	1260	1080
Ar(in²)	11	3640	0.2	982	852	4020	0.2	1210	1030	3550	0.2	924	803	3900	0.2	1130	973
= 3.16	13	3580	0.3	859	745	3950	0.3	1060	901	3490	0.3	809	703	3830	0.3	990	851
	17	3450	0.4	736	639	3790	0.4	907	772	3360	0.4	693	602	3670	0.4	849	730
4-# 8	21	3280	0.5	613	532	3590	0.5	756	643	3190	0.5	578	502	3470	0.5	707	608
2x-2y	25	3100	0.7	368	319	3370	0.7	453	386	3010	0.7	346	301	3250	0.7	424	365
	40	2270	0.9	122	106	2390	0.9	151	128	2180	0.9	115	100	2280	0.9	141	121
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		797	586	8.40	7.20	797	586	8.40	7.20	752	553	8.40	7.20	752	553	8.40	7.20
.93 %	0	3880	0.0	1240	1070	4300	0.0	1490	1270	3790	0.0	1180	1020	4170	0.0	1410	1200
Ar(in²)	11	3730	0.2	1120	962	4110	0.2	1340	1140	3640	0.2	1060	913	3990	0.2	1270	1080
= 6.24	13	3670	0.3	976	841	4040	0.3	1180	996	3580	0.3	926	799	3910	0.3	1110	947
	17	3530	0.4	836	721	3870	0.4	1010	854	3440	0.4	794	685	3740	0.4	949	811
4-#11	21	3360	0.5	697	601	3660	0.5	840	711	3260	0.5	661	571	3540	0.5	791	676
2x-2y	25	3160	0.7	418	360	3430	0.7	504	427	3070	0.7	397	342	3300	0.7	474	405
	40	2300	0.9	139	120	2410	0.9	168	142	2210	0.9	132	114	2300	0.9	158	135
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		796	584	8.40	7.20	796	584	8.40	7.20	751	552	8.40	7.20	751	552	8.40	7.20
1.86 %	0	4070	0.0	1550	1230	4490	0.0	1800	1430	3990	0.0	1490	1180	4370	0.0	1720	1360
Ar(in²)	11	3910	0.2	1400	1110	4290	0.2	1620	1280	3820	0.2	1340	1060	4160	0.2	1540	1230
=12.48	13	3840	0.3	1220	969	4210	0.3	1420	1120	3750	0.3	1170	927	4090	0.3	1350	1070
	17	3690	0.4	1050	830	4030	0.4	1220	963	3590	0.4	1000	794	3900	0.4	1160	921
8-#11	21	3500	0.5	872	692	3800	0.5	1010	802	3400	0.5	836	662	3670	0.5	965	767
4x-2y	25	3280	0.7	523	415	3540	0.7	608	481	3190	0.7	501	397	3420	0.7	579	460
	40	2350	0.9	174	138	2450	0.9	202	160	2250	0.9	167	132	2340	0.9	193	153
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		793	582	8.40	7.20	793	582	8.40	7.20	748	549	8.40	7.20	748	549	8.40	7.20
3.02 %	0	4320	0.0	1790	1570	4740	0.0	2040	1760	4230	0.0	1730	1510	4610	0.0	1950	1700
Ar(in²)	11	4130	0.2	1610	1410	4520	0.2	1830	1580	4040	0.2	1550	1360	4390	0.2	1760	1530
=20.32	13	4060	0.3	1410	1230	4430	0.3	1610	1390	3970	0.3	1360	1190	4300	0.3	1540	1340
	17	3890	0.4	1210	1060	4220	0.4	1380	1190	3790	0.4	1170	1020	4090	0.4	1320	1150
16-#10	21	3680	0.5	1010	880	3970	0.5	1150	989	3580	0.5	971	850	3840	0.5	1100	954
4x-6y	25	3440	0.7	604	528	3690	0.7	687	593	3340	0.7	582	510	3560	0.7	658	572
	40	2400	0.9	201	176	2490	0.9	229	197	2300	0.9	194	170	2370	0.9	219	190
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		789	580	8.40	7.20	789	580	8.40	7.20	744	547	8.40	7.20	744	547	8.40	7.20
3.71 %	0	4470	0.0	1960	1740	4890	0.0	2210	1930	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	4270	0.2	1760	1570	4650	0.2	1990	1740	0	0.2	0	0	0	0.2	0	0
=24.96	13	4190	0.3	1540	1370	4560	0.3	1740	1520	0	0.3	0	0	0	0.3	0	0
	17	4000	0.4	1320	1180	4330	0.4	1490	1310	0	0.4	0	0	0	0.4	0	0
16-#11	21	3780	0.5	1100	979	4070	0.5	1240	1090	0	0.5	0	0	0	0.5	0	0
4x-6y	25	3520	0.7	661	587	3770	0.7	744	653	0	0.7	0	0	0	0.7	0	0
	40	2430	0.9	220	195	2510	0.9	248	217	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		787	578	8.40	7.20	787	578	8.40	7.20	0	0	.00	.00	0	0	.00	.00

Notes :
1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi_c = 0.85$ f'c : 8.0 ksi NW

$\phi_b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 28

Designation		W 14 x 99								W							
Fy (ksi)		36				50											
Reinf.	KL	$\phi_c P_n$	$P_u/(\phi_c P_n)$	Mux	Muy	$\phi_c P_n$	$P_u/(\phi_c P_n)$	Mux	Muy								
.47 %	0	3610	0.0	971	843	3960	0.0	1180	1020								
Ar(in²)	11	3470	0.2	874	759	3790	0.2	1060	920								
= 3.16	13	3410	0.3	765	664	3720	0.3	929	805								
	17	3280	0.4	656	569	3560	0.4	797	690								
4-# 8	21	3110	0.5	546	474	3360	0.5	664	575								
2x-2y	25	2920	0.7	328	284	3140	0.7	398	345								
	40	2100	0.9	109	94	2180	0.9	132	115								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		713	524	8.40	7.20	713	524	8.40	7.20								
.93 %	0	3710	0.0	1120	965	4060	0.0	1330	1140								
Ar(in²)	11	3560	0.2	1010	869	3870	0.2	1200	1030								
= 6.24	13	3500	0.3	882	760	3800	0.3	1050	901								
	17	3350	0.4	756	651	3630	0.4	897	772								
4-#11	21	3180	0.5	630	543	3430	0.5	747	643								
2x-2y	25	2980	0.7	378	325	3200	0.7	448	386								
	40	2120	0.9	126	108	2200	0.9	149	128								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		712	523	8.40	7.20	712	523	8.40	7.20								
1.86 %	0	3910	0.0	1430	1130	4250	0.0	1640	1310								
Ar(in²)	11	3740	0.2	1290	1020	4050	0.2	1480	1180								
=12.48	13	3670	0.3	1130	888	3970	0.3	1290	1030								
	17	3510	0.4	966	761	3790	0.4	1110	882								
8-#11	21	3320	0.5	805	634	3560	0.5	922	735								
4x-2y	25	3100	0.7	483	380	3310	0.7	553	441								
	40	2160	0.9	161	126	2240	0.9	184	147								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		709	521	8.40	7.20	709	521	8.40	7.20								
3.02 %	0	4160	0.0	1670	1470	4500	0.0	1880	1640								
Ar(in²)	11	3960	0.2	1500	1320	4280	0.2	1690	1480								
=20.32	13	3890	0.3	1320	1150	4190	0.3	1480	1290								
	17	3710	0.4	1130	989	3980	0.4	1270	1110								
16-#10	21	3490	0.5	940	824	3730	0.5	1060	922								
4x-6y	25	3250	0.7	564	494	3450	0.7	633	553								
	40	2210	0.9	188	164	2270	0.9	211	184								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		705	518	8.40	7.20	705	518	8.40	7.20								
4.02 %	0	4370	0.0	1980	1640	4710	0.0	2180	1810								
Ar(in²)	11	4150	0.2	1780	1480	4460	0.2	1960	1630								
=27.00	13	4070	0.3	1560	1290	4370	0.3	1720	1430								
	17	3870	0.4	1330	1110	4140	0.4	1470	1220								
12-#14	21	3630	0.5	1110	923	3870	0.5	1230	1020								
4x-4y	25	3370	0.7	666	554	3560	0.7	736	611								
	40	2240	0.9	222	184	2290	0.9	245	203								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		702	515	8.40	7.20	702	515	8.40	7.20								

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for $\phi_c P_n$, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕ_bMnx and Muy = ϕ_bMny when $P_u/(\phi_c P_n)$ = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85   f'c : 8.0 ksi NW
φb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 24 x 28

Designation		W 12 x336								W 12 x305							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.47 %	0	5460	0.0	2310	1630	6640	0.0	3010	1950	5220	0.0	2120	1550	6280	0.0	2740	1850
Ar(in^2)	11	5320	0.2	2080	1470	6430	0.2	2710	1760	5080	0.2	1910	1390	6080	0.2	2470	1660
= 3.16	13	5260	0.3	1820	1290	6340	0.3	2370	1540	5020	0.3	1670	1220	6000	0.3	2160	1450
	17	5120	0.4	1560	1100	6140	0.4	2030	1320	4890	0.4	1430	1040	5800	0.4	1850	1250
4-# 8	21	4960	0.5	1300	919	5900	0.5	1690	1100	4720	0.5	1190	870	5570	0.5	1540	1040
2x-2y	25	4760	0.7	780	551	5610	0.7	1020	658	4520	0.7	715	522	5290	0.7	925	622
	40	3840	0.9	260	183	4320	0.9	338	219	3620	0.9	238	174	4050	0.9	308	207
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
a 15 in		1660	1220	8.40	7.20	1660	1220	8.40	7.20	1530	1130	8.40	7.20	1530	1130	8.40	7.20
.93 %	0	5560	0.0	2460	1750	6730	0.0	3160	2070	5320	0.0	2270	1670	6380	0.0	2890	1960
Ar(in^2)	11	5410	0.2	2210	1580	6520	0.2	2840	1860	5170	0.2	2040	1500	6170	0.2	2600	1770
= 6.24	13	5350	0.3	1940	1380	6430	0.3	2490	1630	5110	0.3	1790	1310	6090	0.3	2280	1550
	17	5210	0.4	1660	1180	6220	0.4	2130	1400	4970	0.4	1530	1120	5890	0.4	1950	1320
4-#11	21	5030	0.5	1380	986	5970	0.5	1780	1160	4800	0.5	1280	937	5640	0.5	1630	1100
2x-2y	25	4830	0.7	830	591	5680	0.7	1070	698	4600	0.7	766	562	5360	0.7	975	662
	40	3880	0.9	276	197	4350	0.9	355	232	3660	0.9	255	187	4080	0.9	325	220
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
a 16 in		1660	1220	8.40	7.20	1660	1220	8.40	7.20	1530	1130	8.40	7.20	1530	1130	8.40	7.20
1.86 %	0	5760	0.0	2770	1910	6930	0.0	3460	2230	5510	0.0	2580	1820	6580	0.0	3200	2120
Ar(in^2)	11	5600	0.2	2490	1720	6700	0.2	3120	2000	5350	0.2	2320	1640	6350	0.2	2880	1910
=12.48	13	5530	0.3	2180	1500	6610	0.3	2730	1750	5290	0.3	2030	1440	6270	0.3	2520	1670
	17	5380	0.4	1870	1290	6390	0.4	2340	1500	5140	0.4	1740	1230	6050	0.4	2160	1430
8-#11	21	5190	0.5	1560	1070	6120	0.5	1950	1250	4960	0.5	1450	1030	5790	0.5	1800	1190
4x-2y	25	4980	0.7	934	644	5820	0.7	1170	751	4740	0.7	870	615	5490	0.7	1080	714
	40	3960	0.9	311	214	4420	0.9	389	250	3740	0.9	290	205	4150	0.9	360	238
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
a 16 in		1650	1210	8.40	7.20	1650	1210	8.40	7.20	1530	1120	8.40	7.20	1530	1120	8.40	7.20
3.02 %	0	6000	0.0	2980	2240	7180	0.0	3660	2550	5760	0.0	2800	2150	6830	0.0	3410	2440
Ar(in^2)	11	5830	0.2	2690	2010	6930	0.2	3290	2300	5590	0.2	2520	1940	6580	0.2	3070	2200
=20.32	13	5760	0.3	2350	1760	6830	0.3	2880	2010	5520	0.3	2200	1700	6490	0.3	2680	1920
	17	5600	0.4	2010	1510	6600	0.4	2470	1720	5350	0.4	1890	1450	6260	0.4	2300	1650
16-#10	21	5390	0.5	1680	1260	6310	0.5	2060	1430	5150	0.5	1570	1210	5980	0.5	1920	1370
4x-6y	25	5160	0.7	1010	754	5980	0.7	1230	860	4920	0.7	944	727	5660	0.7	1150	824
	40	4060	0.9	335	251	4500	0.9	411	286	3840	0.9	314	242	4220	0.9	383	274
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
a 15 in		1650	1210	8.40	7.20	1650	1210	8.40	7.20	1530	1120	8.40	7.20	1530	1120	8.40	7.20
4.02 %	0	6220	0.0	3310	2410	7390	0.0	4010	2720	5970	0.0	3120	2330	7040	0.0	3740	2610
Ar(in^2)	11	6030	0.2	2980	2170	7130	0.2	3610	2440	5780	0.2	2810	2090	6780	0.2	3370	2350
=27.00	13	5960	0.3	2610	1900	7020	0.3	3160	2140	5710	0.3	2460	1830	6680	0.3	2950	2050
	17	5780	0.4	2240	1630	6780	0.4	2700	1830	5530	0.4	2110	1570	6430	0.4	2530	1760
12-#14	21	5560	0.5	1860	1360	6470	0.5	2250	1530	5320	0.5	1760	1310	6140	0.5	2110	1470
4x-4y	25	5310	0.7	1120	813	6120	0.7	1350	916	5070	0.7	1050	784	5800	0.7	1260	880
	40	4150	0.9	372	271	4570	0.9	450	305	3920	0.9	351	261	4290	0.9	421	293
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
a 16 in		1650	1210	8.40	7.20	1650	1210	8.40	7.20	1520	1120	8.40	7.20	1520	1120	8.40	7.20

Notes :
1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 28

Designation		W 12 x279								W 12 x252							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.47 %	0	5010	0.0	1960	1470	5990	0.0	2520	1750	4810	0.0	1800	1390	5690	0.0	2300	1650
Ar(in^2)	11	4870	0.2	1770	1320	5790	0.2	2270	1580	4670	0.2	1620	1250	5490	0.2	2070	1490
= 3.16	13	4820	0.3	1540	1160	5710	0.3	1990	1380	4610	0.3	1420	1100	5420	0.3	1820	1300
	17	4680	0.4	1320	993	5520	0.4	1700	1180	4480	0.4	1220	940	5230	0.4	1560	1120
4-# 8	21	4520	0.5	1100	827	5290	0.5	1420	984	4320	0.5	1010	783	5010	0.5	1300	929
2x-2y	25	4330	0.7	661	496	5020	0.7	850	590	4130	0.7	608	470	4750	0.7	777	557
	40	3440	0.9	220	165	3820	0.9	283	196	3260	0.9	202	156	3590	0.9	259	185
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1430	1050	8.40	7.20	1430	1050	8.40	7.20	1320	972	8.40	7.20	1320	972	8.40	7.20
.93 %	0	5110	0.0	2110	1590	6090	0.0	2670	1870	4900	0.0	1950	1510	5790	0.0	2450	1770
Ar(in^2)	11	4960	0.2	1900	1430	5880	0.2	2400	1680	4760	0.2	1760	1360	5580	0.2	2210	1590
= 6.24	13	4910	0.3	1660	1250	5800	0.3	2100	1470	4700	0.3	1540	1190	5510	0.3	1930	1390
	17	4770	0.4	1420	1070	5600	0.4	1800	1260	4560	0.4	1320	1020	5320	0.4	1660	1200
4-#11	21	4600	0.5	1190	894	5370	0.5	1500	1050	4390	0.5	1100	850	5080	0.5	1380	996
2x-2y	25	4400	0.7	711	536	5090	0.7	900	630	4200	0.7	658	510	4820	0.7	827	597
	40	3480	0.9	237	178	3850	0.9	300	210	3290	0.9	219	170	3620	0.9	275	199
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1430	1050	8.40	7.20	1430	1050	8.40	7.20	1320	971	8.40	7.20	1320	971	8.40	7.20
1.86 %	0	5310	0.0	2420	1750	6280	0.0	2980	2020	5100	0.0	2260	1670	5980	0.0	2760	1930
Ar(in^2)	11	5150	0.2	2180	1570	6060	0.2	2680	1820	4940	0.2	2040	1500	5770	0.2	2480	1730
=12.48	13	5090	0.3	1900	1380	5980	0.3	2340	1590	4880	0.3	1780	1310	5680	0.3	2170	1520
	17	4940	0.4	1630	1180	5770	0.4	2010	1370	4730	0.4	1530	1130	5480	0.4	1860	1300
8-#11	21	4750	0.5	1360	982	5520	0.5	1670	1140	4550	0.5	1270	938	5230	0.5	1550	1080
4x-2y	25	4540	0.7	816	589	5220	0.7	1000	682	4340	0.7	763	563	4950	0.7	931	650
	40	3560	0.9	272	196	3920	0.9	334	227	3370	0.9	254	187	3680	0.9	310	216
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1420	1050	8.40	7.20	1420	1050	8.40	7.20	1320	968	8.40	7.20	1320	968	8.40	7.20
3.02 %	0	5560	0.0	2640	2080	6530	0.0	3200	2350	5350	0.0	2480	2000	6230	0.0	2980	2250
Ar(in^2)	11	5380	0.2	2370	1870	6290	0.2	2880	2120	5180	0.2	2230	1800	6000	0.2	2680	2030
=20.32	13	5320	0.3	2080	1640	6200	0.3	2520	1850	5110	0.3	1950	1580	5910	0.3	2350	1780
	17	5150	0.4	1780	1400	5970	0.4	2160	1590	4940	0.4	1670	1350	5680	0.4	2010	1520
16-#10	21	4950	0.5	1480	1170	5700	0.5	1800	1320	4740	0.5	1400	1130	5420	0.5	1680	1270
4x-6y	25	4720	0.7	890	701	5390	0.7	1080	793	4510	0.7	837	675	5110	0.7	1010	760
	40	3650	0.9	296	233	3990	0.9	359	264	3460	0.9	279	225	3750	0.9	335	253
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1420	1040	8.40	7.20	1420	1040	8.40	7.20	1320	966	8.40	7.20	1320	966	8.40	7.20
4.02 %	0	5770	0.0	2960	2250	6740	0.0	3520	2520	5560	0.0	2800	2170	6440	0.0	3300	2420
Ar(in^2)	11	5580	0.2	2660	2030	6490	0.2	3170	2270	5370	0.2	2520	1960	6190	0.2	2970	2180
=27.00	13	5510	0.3	2330	1770	6390	0.3	2770	1980	5300	0.3	2210	1710	6090	0.3	2600	1910
	17	5330	0.4	2000	1520	6150	0.4	2380	1700	5120	0.4	1890	1470	5860	0.4	2230	1630
12-#14	21	5110	0.5	1670	1270	5860	0.5	1980	1420	4910	0.5	1580	1220	5570	0.5	1860	1360
4x-4y	25	4860	0.7	999	759	5520	0.7	1190	849	4660	0.7	946	733	5240	0.7	1120	817
	40	3730	0.9	333	253	4050	0.9	395	283	3530	0.9	315	244	3800	0.9	371	272
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1420	1040	8.40	7.20	1420	1040	8.40	7.20	1310	963	8.40	7.20	1310	963	8.40	7.20

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85   f'c : 8.0 ksi NW
φb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 24 x 28

Designation		W 12 x230								W 12 x210							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.47 %	0	4640	0.0	1680	1330	5440	0.0	2130	1570	4480	0.0	1570	1260	5220	0.0	1980	1500
Ar(in²)	11	4500	0.2	1510	1190	5250	0.2	1920	1410	4340	0.2	1410	1140	5030	0.2	1780	1350
= 3.16	13	4440	0.3	1320	1040	5180	0.3	1680	1240	4290	0.3	1230	994	4960	0.3	1560	1180
	17	4310	0.4	1130	895	5000	0.4	1440	1060	4160	0.4	1060	852	4780	0.4	1330	1010
4-# 8	21	4150	0.5	945	746	4780	0.5	1200	884	4000	0.5	880	710	4570	0.5	1110	841
2x-2y	25	3960	0.7	567	447	4530	0.7	720	530	3810	0.7	528	426	4320	0.7	667	504
	40	3100	0.9	189	149	3390	0.9	240	176	2960	0.9	176	142	3220	0.9	222	168
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1240	908	8.40	7.20	1240	908	8.40	7.20	1160	849	8.40	7.20	1160	849	8.40	7.20
.93 %	0	4730	0.0	1830	1450	5540	0.0	2280	1690	4580	0.0	1710	1380	5310	0.0	2130	1610
Ar(in²)	11	4590	0.2	1650	1300	5340	0.2	2050	1520	4430	0.2	1540	1240	5120	0.2	1910	1450
= 6.24	13	4530	0.3	1440	1140	5270	0.3	1800	1330	4380	0.3	1350	1090	5040	0.3	1670	1270
	17	4400	0.4	1230	976	5080	0.4	1540	1140	4240	0.4	1160	933	4860	0.4	1430	1090
4-#11	21	4230	0.5	1030	813	4850	0.5	1280	951	4070	0.5	964	777	4640	0.5	1200	908
2x-2y	25	4030	0.7	617	488	4590	0.7	770	570	3880	0.7	578	466	4380	0.7	717	544
	40	3140	0.9	205	162	3420	0.9	256	190	2990	0.9	192	155	3240	0.9	239	181
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1240	907	8.40	7.20	1240	907	8.40	7.20	1160	848	8.40	7.20	1160	848	8.40	7.20
1.86 %	0	4930	0.0	2140	1600	5740	0.0	2590	1850	4780	0.0	2020	1550	5510	0.0	2430	1770
Ar(in²)	11	4770	0.2	1920	1440	5520	0.2	2330	1660	4620	0.2	1820	1390	5300	0.2	2190	1590
=12.48	13	4710	0.3	1680	1260	5440	0.3	2040	1450	4560	0.3	1590	1220	5220	0.3	1920	1390
	17	4560	0.4	1440	1080	5240	0.4	1750	1250	4410	0.4	1370	1040	5020	0.4	1640	1200
8-#11	21	4380	0.5	1200	902	5000	0.5	1460	1040	4220	0.5	1140	869	4780	0.5	1370	995
4x-2y	25	4170	0.7	721	541	4720	0.7	874	623	4010	0.7	682	521	4510	0.7	821	597
	40	3210	0.9	240	180	3480	0.9	291	207	3060	0.9	227	173	3300	0.9	273	199
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1230	905	8.40	7.20	1230	905	8.40	7.20	1150	846	8.40	7.20	1150	846	8.40	7.20
3.02 %	0	5180	0.0	2360	1940	5990	0.0	2810	2180	5020	0.0	2240	1870	5760	0.0	2650	2100
Ar(in²)	11	5010	0.2	2120	1740	5750	0.2	2530	1960	4850	0.2	2020	1690	5530	0.2	2390	1890
=20.32	13	4940	0.3	1860	1520	5660	0.3	2210	1710	4780	0.3	1770	1480	5440	0.3	2090	1660
	17	4770	0.4	1590	1310	5450	0.4	1900	1470	4620	0.4	1510	1260	5230	0.4	1790	1420
16-#10	21	4570	0.5	1330	1090	5180	0.5	1580	1220	4410	0.5	1260	1050	4970	0.5	1490	1180
4x-6y	25	4340	0.7	795	653	4880	0.7	948	734	4180	0.7	757	632	4670	0.7	895	709
	40	3300	0.9	265	217	3550	0.9	316	244	3140	0.9	252	210	3360	0.9	298	236
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1230	902	8.40	7.20	1230	902	8.40	7.20	1150	843	8.40	7.20	1150	843	8.40	7.20
4.02 %	0	5390	0.0	2680	2110	6200	0.0	3130	2350	5230	0.0	2570	2050	5970	0.0	2980	2270
Ar(in²)	11	5200	0.2	2410	1900	5950	0.2	2820	2110	5040	0.2	2310	1840	5720	0.2	2680	2050
=27.00	13	5130	0.3	2110	1660	5850	0.3	2470	1850	4970	0.3	2020	1610	5630	0.3	2340	1790
	17	4950	0.4	1810	1420	5620	0.4	2110	1590	4790	0.4	1730	1380	5400	0.4	2010	1540
12-#14	21	4730	0.5	1510	1190	5340	0.5	1760	1320	4570	0.5	1440	1150	5120	0.5	1670	1280
4x-4y	25	4480	0.7	904	711	5010	0.7	1060	792	4320	0.7	865	690	4800	0.7	1000	767
	40	3360	0.9	301	237	3600	0.9	352	264	3210	0.9	288	230	3410	0.9	334	255
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1230	900	8.40	7.20	1230	900	8.40	7.20	1150	841	8.40	7.20	1150	841	8.40	7.20

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 28

Designation		W 12 x190								W 12 x170							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.47 %	0	4320	0.0	1450	1200	4990	0.0	1820	1420	4170	0.0	1350	1130	4760	0.0	1670	1340
Ar(in²)	11	4180	0.2	1310	1080	4800	0.2	1640	1270	4030	0.2	1210	1010	4580	0.2	1510	1200
= 3.16	13	4130	0.3	1150	941	4730	0.3	1440	1120	3970	0.3	1060	888	4510	0.3	1320	1050
	17	4000	0.4	981	807	4560	0.4	1230	956	3840	0.4	907	761	4340	0.4	1130	901
4-# 8	21	3840	0.5	817	672	4350	0.5	1030	796	3680	0.5	756	634	4140	0.5	941	751
2x-2y	25	3650	0.7	490	403	4110	0.7	615	478	3500	0.7	453	380	3900	0.7	564	450
	40	2810	0.9	163	134	3030	0.9	205	159	2660	0.9	151	126	2850	0.9	188	150
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1080	790	8.40	7.20	1080	790	8.40	7.20	996	732	8.40	7.20	996	732	8.40	7.20
.93 %	0	4420	0.0	1600	1320	5080	0.0	1970	1540	4270	0.0	1490	1250	4860	0.0	1820	1460
Ar(in²)	11	4270	0.2	1440	1180	4890	0.2	1770	1380	4120	0.2	1340	1120	4670	0.2	1640	1310
= 6.24	13	4220	0.3	1260	1040	4820	0.3	1550	1210	4060	0.3	1180	982	4600	0.3	1430	1150
	17	4080	0.4	1080	888	4640	0.4	1330	1040	3930	0.4	1010	842	4420	0.4	1230	982
4-#11	21	3910	0.5	901	740	4420	0.5	1110	863	3760	0.5	839	702	4210	0.5	1020	818
2x-2y	25	3720	0.7	540	444	4170	0.7	665	518	3560	0.7	503	421	3960	0.7	614	491
	40	2840	0.9	180	148	3060	0.9	221	172	2690	0.9	167	140	2880	0.9	204	163
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1070	789	8.40	7.20	1070	789	8.40	7.20	995	731	8.40	7.20	995	731	8.40	7.20
1.86 %	0	4620	0.0	1910	1480	5280	0.0	2280	1690	4460	0.0	1800	1410	5060	0.0	2130	1610
Ar(in²)	11	4460	0.2	1720	1330	5070	0.2	2050	1520	4300	0.2	1620	1270	4850	0.2	1920	1450
=12.48	13	4400	0.3	1510	1160	4990	0.3	1800	1330	4240	0.3	1420	1110	4770	0.3	1680	1270
	17	4250	0.4	1290	997	4800	0.4	1540	1140	4090	0.4	1220	951	4580	0.4	1440	1090
8-#11	21	4060	0.5	1080	831	4560	0.5	1280	952	3910	0.5	1010	793	4350	0.5	1200	906
4x-2y	25	3850	0.7	645	498	4290	0.7	769	571	3700	0.7	608	475	4090	0.7	718	544
	40	2910	0.9	215	166	3110	0.9	256	190	2760	0.9	202	158	2930	0.9	239	181
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1070	786	8.40	7.20	1070	786	8.40	7.20	992	729	8.40	7.20	992	729	8.40	7.20
3.02 %	0	4860	0.0	2130	1810	5530	0.0	2500	2020	4710	0.0	2030	1740	5310	0.0	2350	1940
Ar(in²)	11	4690	0.2	1920	1630	5300	0.2	2250	1820	4530	0.2	1820	1570	5080	0.2	2110	1750
=20.32	13	4620	0.3	1680	1420	5210	0.3	1970	1590	4460	0.3	1590	1370	4990	0.3	1850	1530
	17	4450	0.4	1440	1220	5000	0.4	1690	1370	4300	0.4	1370	1170	4780	0.4	1580	1310
16-#10	21	4250	0.5	1200	1020	4740	0.5	1400	1140	4090	0.5	1140	979	4530	0.5	1320	1090
4x-6y	25	4020	0.7	719	610	4450	0.7	842	683	3860	0.7	683	587	4240	0.7	792	656
	40	2980	0.9	239	203	3170	0.9	280	227	2830	0.9	227	195	2980	0.9	264	218
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1070	784	8.40	7.20	1070	784	8.40	7.20	988	726	8.40	7.20	988	726	8.40	7.20
4.02 %	0	5080	0.0	2450	1980	5740	0.0	2820	2200	4920	0.0	2350	1910	5520	0.0	2670	2120
Ar(in²)	11	4880	0.2	2210	1780	5490	0.2	2540	1980	4730	0.2	2110	1720	5270	0.2	2410	1900
=27.00	13	4810	0.3	1930	1560	5400	0.3	2220	1730	4650	0.3	1850	1510	5180	0.3	2100	1670
	17	4630	0.4	1660	1340	5170	0.4	1910	1480	4470	0.4	1580	1290	4950	0.4	1800	1430
12-#14	21	4410	0.5	1380	1110	4890	0.5	1590	1240	4250	0.5	1320	1080	4680	0.5	1500	1190
4x-4y	25	4160	0.7	828	668	4580	0.7	952	741	3990	0.7	791	645	4360	0.7	902	714
	40	3040	0.9	276	222	3220	0.9	317	247	2880	0.9	263	215	3030	0.9	300	238
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1060	781	8.40	7.20	1060	781	8.40	7.20	985	723	8.40	7.20	985	723	8.40	7.20

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 28

Designation		W 12 x152								W 12 x136							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.47 %	0	4030	0.0	1250	1060	4560	0.0	1540	1260	3900	0.0	1160	997	4370	0.0	1420	1190
Ar(in²)	11	3890	0.2	1120	955	4380	0.2	1390	1130	3760	0.2	1050	897	4200	0.2	1280	1070
= 3.16	13	3830	0.3	983	836	4310	0.3	1210	991	3700	0.3	915	785	4130	0.3	1120	933
	17	3700	0.4	843	716	4140	0.4	1040	850	3570	0.4	784	673	3960	0.4	959	800
4-# 8	21	3540	0.5	702	597	3940	0.5	866	708	3410	0.5	653	561	3760	0.5	799	667
2x-2y	25	3360	0.7	421	358	3710	0.7	520	425	3230	0.7	392	336	3540	0.7	479	400
	40	2520	0.9	140	119	2690	0.9	173	141	2400	0.9	130	112	2540	0.9	159	133
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		925	679	8.40	7.20	925	679	8.40	7.20	860	631	8.40	7.20	860	631	8.40	7.20
.93 %	0	4120	0.0	1400	1180	4660	0.0	1690	1380	4000	0.0	1310	1120	4470	0.0	1570	1310
Ar(in²)	11	3980	0.2	1260	1060	4470	0.2	1520	1240	3850	0.2	1180	1010	4290	0.2	1410	1180
= 6.24	13	3920	0.3	1100	931	4400	0.3	1330	1090	3790	0.3	1030	880	4220	0.3	1240	1030
	17	3780	0.4	942	798	4220	0.4	1140	930	3650	0.4	884	755	4040	0.4	1060	881
4-#11	21	3610	0.5	785	665	4010	0.5	950	775	3480	0.5	736	629	3830	0.5	882	734
2x-2y	25	3420	0.7	471	399	3770	0.7	570	465	3290	0.7	442	377	3600	0.7	529	440
	40	2550	0.9	157	133	2710	0.9	190	155	2430	0.9	147	125	2560	0.9	176	146
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		923	678	8.40	7.20	923	678	8.40	7.20	858	630	8.40	7.20	858	630	8.40	7.20
1.86 %	0	4320	0.0	1710	1340	4850	0.0	2000	1540	4190	0.0	1620	1280	4670	0.0	1880	1470
Ar(in²)	11	4160	0.2	1540	1210	4650	0.2	1800	1390	4030	0.2	1460	1150	4470	0.2	1690	1320
=12.48	13	4100	0.3	1340	1060	4570	0.3	1570	1210	3970	0.3	1280	1010	4390	0.3	1480	1160
	17	3950	0.4	1150	907	4380	0.4	1350	1040	3810	0.4	1090	864	4200	0.4	1270	990
8-#11	21	3760	0.5	959	756	4150	0.5	1120	866	3630	0.5	911	720	3970	0.5	1060	825
4x-2y	25	3550	0.7	575	453	3890	0.7	674	520	3420	0.7	546	432	3720	0.7	633	495
	40	2610	0.9	191	151	2760	0.9	224	173	2480	0.9	182	144	2600	0.9	211	165
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		920	676	8.40	7.20	920	676	8.40	7.20	855	628	8.40	7.20	855	628	8.40	7.20
3.02 %	0	4570	0.0	1930	1680	5100	0.0	2220	1870	4440	0.0	1840	1610	4920	0.0	2100	1800
Ar(in²)	11	4390	0.2	1740	1510	4880	0.2	1990	1680	4260	0.2	1660	1450	4690	0.2	1890	1620
=20.32	13	4320	0.3	1520	1320	4790	0.3	1740	1470	4190	0.3	1450	1270	4610	0.3	1650	1420
	17	4150	0.4	1300	1130	4580	0.4	1500	1260	4020	0.4	1240	1090	4400	0.4	1420	1210
16-#10	21	3940	0.5	1090	942	4330	0.5	1250	1050	3810	0.5	1040	907	4150	0.5	1180	1010
4x-6y	25	3710	0.7	651	565	4040	0.7	747	631	3570	0.7	622	544	3860	0.7	707	606
	40	2680	0.9	217	188	2810	0.9	249	210	2540	0.9	207	181	2650	0.9	235	202
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		916	673	8.40	7.20	916	673	8.40	7.20	851	625	8.40	7.20	851	625	8.40	7.20
4.02 %	0	4780	0.0	2250	1850	5310	0.0	2540	2040	4650	0.0	2160	1790	5130	0.0	2420	1970
Ar(in²)	11	4580	0.2	2020	1660	5070	0.2	2290	1840	4450	0.2	1950	1610	4880	0.2	2180	1770
=27.00	13	4510	0.3	1770	1460	4970	0.3	2000	1610	4370	0.3	1700	1410	4790	0.3	1910	1550
	17	4320	0.4	1520	1250	4750	0.4	1710	1380	4180	0.4	1460	1210	4560	0.4	1630	1330
12-#14	21	4100	0.5	1270	1040	4470	0.5	1430	1150	3960	0.5	1220	1000	4290	0.5	1360	1110
4x-4y	25	3840	0.7	759	623	4160	0.7	857	689	3700	0.7	729	602	3980	0.7	817	664
	40	2730	0.9	253	207	2850	0.9	285	229	2580	0.9	243	200	2680	0.9	272	221
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		913	671	8.40	7.20	913	671	8.40	7.20	848	623	8.40	7.20	848	623	8.40	7.20

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 28

Designation		W 12 x120								W 12 x106							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.47 %	0	3780	0.0	1080	932	4200	0.0	1310	1110	3670	0.0	1010	870	4040	0.0	1210	1040
Ar(in²)	11	3640	0.2	971	839	4020	0.2	1180	999	3520	0.2	906	783	3870	0.2	1090	934
= 3.16	13	3580	0.3	850	734	3950	0.3	1030	874	3470	0.3	793	685	3800	0.3	952	818
	17	3450	0.4	728	629	3790	0.4	883	749	3330	0.4	680	587	3640	0.4	816	701
4-# 8	21	3280	0.5	607	524	3590	0.5	735	624	3170	0.5	566	489	3440	0.5	680	584
2x-2y	25	3100	0.7	364	314	3370	0.7	441	374	2980	0.7	340	293	3220	0.7	408	350
	40	2270	0.9	121	104	2390	0.9	147	124	2160	0.9	113	97	2250	0.9	136	116
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		797	586	8.40	7.20	797	586	8.40	7.20	742	545	8.40	7.20	742	545	8.40	7.20
.93 %	0	3880	0.0	1230	1050	4300	0.0	1460	1230	3770	0.0	1160	992	4140	0.0	1360	1160
Ar(in²)	11	3730	0.2	1100	948	4110	0.2	1310	1110	3610	0.2	1040	892	3950	0.2	1220	1040
= 6.24	13	3670	0.3	966	830	4040	0.3	1150	969	3560	0.3	910	781	3880	0.3	1070	913
	17	3530	0.4	828	711	3870	0.4	982	831	3410	0.4	780	669	3710	0.4	916	782
4-#11	21	3360	0.5	690	592	3660	0.5	819	692	3240	0.5	650	558	3510	0.5	763	652
2x-2y	25	3160	0.7	414	355	3430	0.7	491	415	3040	0.7	390	334	3270	0.7	458	391
	40	2300	0.9	138	118	2410	0.9	163	138	2180	0.9	130	111	2270	0.9	152	130
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		796	584	8.40	7.20	796	584	8.40	7.20	740	544	8.40	7.20	740	544	8.40	7.20
1.86 %	0	4070	0.0	1540	1220	4490	0.0	1760	1390	3960	0.0	1470	1150	4340	0.0	1670	1320
Ar(in²)	11	3910	0.2	1380	1090	4290	0.2	1590	1250	3790	0.2	1320	1040	4130	0.2	1500	1190
=12.48	13	3840	0.3	1210	957	4210	0.3	1390	1100	3730	0.3	1150	908	4060	0.3	1310	1040
	17	3690	0.4	1040	820	4030	0.4	1190	940	3570	0.4	989	779	3870	0.4	1120	892
8-#11	21	3500	0.5	864	684	3800	0.5	992	783	3380	0.5	824	649	3640	0.5	937	743
4x-2y	25	3280	0.7	518	410	3540	0.7	595	470	3160	0.7	494	389	3390	0.7	562	446
	40	2350	0.9	172	136	2450	0.9	198	156	2230	0.9	164	129	2310	0.9	187	148
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		793	582	8.40	7.20	793	582	8.40	7.20	737	541	8.40	7.20	737	541	8.40	7.20
3.02 %	0	4320	0.0	1760	1550	4740	0.0	1980	1720	4210	0.0	1690	1490	4580	0.0	1890	1650
Ar(in²)	11	4130	0.2	1590	1390	4520	0.2	1790	1550	4020	0.2	1520	1340	4360	0.2	1700	1490
=20.32	13	4060	0.3	1390	1220	4430	0.3	1560	1360	3950	0.3	1330	1170	4270	0.3	1490	1300
	17	3890	0.4	1190	1050	4220	0.4	1340	1160	3770	0.4	1140	1000	4060	0.4	1270	1120
16-#10	21	3680	0.5	991	871	3970	0.5	1120	969	3550	0.5	951	837	3810	0.5	1060	930
4x-6y	25	3440	0.7	594	522	3690	0.7	669	581	3310	0.7	570	502	3530	0.7	636	558
	40	2400	0.9	198	174	2490	0.9	223	193	2280	0.9	190	167	2350	0.9	212	186
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		789	580	8.40	7.20	789	580	8.40	7.20	733	539	8.40	7.20	733	539	8.40	7.20
4.02 %	0	4530	0.0	2080	1720	4950	0.0	2310	1900	4420	0.0	2010	1660	4790	0.0	2210	1830
Ar(in²)	11	4320	0.2	1870	1550	4710	0.2	2080	1710	4210	0.2	1810	1500	4550	0.2	1990	1640
=27.00	13	4250	0.3	1640	1360	4610	0.3	1820	1490	4130	0.3	1580	1310	4450	0.3	1740	1440
	17	4050	0.4	1400	1160	4380	0.4	1560	1280	3930	0.4	1360	1120	4220	0.4	1490	1230
12-#14	21	3820	0.5	1170	968	4110	0.5	1300	1070	3700	0.5	1130	934	3950	0.5	1240	1030
4x-4y	25	3560	0.7	702	581	3800	0.7	778	639	3430	0.7	677	560	3640	0.7	745	616
	40	2440	0.9	234	193	2520	0.9	259	213	2310	0.9	225	186	2370	0.9	248	205
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		786	577	8.40	7.20	786	577	8.40	7.20	730	536	8.40	7.20	730	536	8.40	7.20

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 28

Designation		W 12 x 96								W							
Fy (ksi)		36				50											
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy								
.47 %	0	3590	0.0	956	822	3930	0.0	1140	983								
Ar(in²)	11	3440	0.2	860	740	3750	0.2	1030	885								
= 3.16	13	3390	0.3	753	648	3680	0.3	897	774								
	17	3250	0.4	645	555	3520	0.4	769	664								
4-# 8	21	3090	0.5	537	462	3330	0.5	640	553								
2x-2y	25	2900	0.7	322	277	3110	0.7	384	332								
	40	2070	0.9	107	92	2150	0.9	128	110								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		701	515	8.40	7.20	701	515	8.40	7.20								
.93 %	0	3690	0.0	1100	945	4020	0.0	1290	1110								
Ar(in²)	11	3530	0.2	994	850	3840	0.2	1160	994								
= 6.24	13	3470	0.3	869	744	3770	0.3	1010	870								
	17	3330	0.4	745	637	3600	0.4	868	746								
4-#11	21	3160	0.5	621	531	3390	0.5	724	621								
2x-2y	25	2960	0.7	372	318	3160	0.7	434	373								
	40	2100	0.9	124	106	2170	0.9	144	124								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		700	514	8.40	7.20	700	514	8.40	7.20								
1.86 %	0	3880	0.0	1410	1110	4220	0.0	1600	1270								
Ar(in²)	11	3710	0.2	1270	996	4020	0.2	1440	1140								
=12.48	13	3650	0.3	1110	871	3940	0.3	1260	997								
	17	3490	0.4	954	747	3750	0.4	1080	855								
8-#11	21	3290	0.5	795	622	3530	0.5	898	712								
4x-2y	25	3080	0.7	477	373	3270	0.7	538	427								
	40	2140	0.9	159	124	2200	0.9	179	142								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		697	512	8.40	7.20	697	512	8.40	7.20								
3.02 %	0	4130	0.0	1640	1440	4470	0.0	1820	1600								
Ar(in²)	11	3940	0.2	1480	1300	4240	0.2	1640	1440								
=20.32	13	3860	0.3	1290	1140	4150	0.3	1430	1260								
	17	3680	0.4	1110	973	3940	0.4	1230	1080								
16-#10	21	3460	0.5	923	811	3690	0.5	1020	899								
4x-6y	25	3220	0.7	553	486	3410	0.7	613	539								
	40	2180	0.9	184	162	2240	0.9	204	179								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		693	509	8.40	7.20	693	509	8.40	7.20								
4.02 %	0	4340	0.0	1960	1620	4680	0.0	2140	1770								
Ar(in²)	11	4130	0.2	1760	1450	4430	0.2	1930	1600								
=27.00	13	4040	0.3	1540	1270	4330	0.3	1680	1400								
	17	3840	0.4	1320	1090	4100	0.4	1440	1200								
12-#14	21	3610	0.5	1100	908	3830	0.5	1200	997								
4x-4y	25	3340	0.7	660	545	3520	0.7	721	598								
	40	2210	0.9	220	181	2260	0.9	240	199								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		690	507	8.40	7.20	690	507	8.40	7.20								

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 8.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 28

Designation		W 10 x112								W 10 x100							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.47 %	0	3710	0.0	1040	894	4110	0.0	1230	1050	3620	0.0	984	844	3970	0.0	1150	994
Ar(in²)	11	3570	0.2	934	805	3930	0.2	1100	946	3480	0.2	886	760	3800	0.2	1040	894
= 3.16	13	3520	0.3	817	704	3860	0.3	965	828	3420	0.3	775	665	3730	0.3	907	783
	17	3380	0.4	701	604	3700	0.4	827	709	3280	0.4	664	570	3570	0.4	778	671
4-# 8	21	3220	0.5	584	503	3500	0.5	689	591	3120	0.5	553	475	3370	0.5	648	559
2x-2y	25	3030	0.7	350	302	3280	0.7	413	354	2930	0.7	332	285	3150	0.7	389	335
	40	2210	0.9	116	100	2310	0.9	137	118	2110	0.9	110	95	2190	0.9	129	111
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		765	562	8.40	7.20	765	562	8.40	7.20	717	527	8.40	7.20	717	527	8.40	7.20
.93 %	0	3810	0.0	1190	1020	4200	0.0	1370	1170	3720	0.0	1130	966	4070	0.0	1300	1120
Ar(in²)	11	3660	0.2	1070	914	4020	0.2	1240	1050	3570	0.2	1020	869	3890	0.2	1170	1000
= 6.24	13	3600	0.3	933	800	3950	0.3	1080	922	3510	0.3	891	760	3820	0.3	1020	878
	17	3460	0.4	800	685	3780	0.4	927	790	3360	0.4	764	652	3640	0.4	877	752
4-#11	21	3290	0.5	667	571	3570	0.5	772	658	3190	0.5	636	543	3440	0.5	731	627
2x-2y	25	3090	0.7	400	342	3340	0.7	463	395	2990	0.7	382	326	3210	0.7	438	376
	40	2230	0.9	133	114	2330	0.9	154	131	2130	0.9	127	108	2210	0.9	146	125
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		763	561	8.40	7.20	763	561	8.40	7.20	716	526	8.40	7.20	716	526	8.40	7.20
1.86 %	0	4010	0.0	1490	1180	4400	0.0	1680	1330	3920	0.0	1440	1130	4270	0.0	1610	1280
Ar(in²)	11	3840	0.2	1340	1060	4200	0.2	1510	1200	3750	0.2	1300	1020	4060	0.2	1450	1150
=12.48	13	3780	0.3	1180	927	4120	0.3	1320	1050	3680	0.3	1130	888	3990	0.3	1270	1010
	17	3620	0.4	1010	795	3930	0.4	1140	899	3520	0.4	972	761	3800	0.4	1090	862
8-#11	21	3430	0.5	840	662	3710	0.5	945	749	3330	0.5	810	634	3570	0.5	904	718
4x-2y	25	3210	0.7	504	397	3450	0.7	567	449	3110	0.7	486	380	3320	0.7	542	431
	40	2280	0.9	168	132	2370	0.9	189	149	2170	0.9	162	126	2250	0.9	180	143
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		760	558	8.40	7.20	760	558	8.40	7.20	713	524	8.40	7.20	713	524	8.40	7.20
3.02 %	0	4260	0.0	1700	1510	4650	0.0	1880	1660	4160	0.0	1650	1460	4510	0.0	1810	1610
Ar(in²)	11	4070	0.2	1530	1360	4420	0.2	1690	1500	3970	0.2	1480	1320	4290	0.2	1630	1450
=20.32	13	3990	0.3	1340	1190	4340	0.3	1480	1310	3900	0.3	1300	1150	4200	0.3	1420	1270
	17	3820	0.4	1150	1020	4130	0.4	1270	1120	3720	0.4	1110	986	3990	0.4	1220	1090
16-#10	21	3600	0.5	956	849	3880	0.5	1060	935	3500	0.5	926	822	3740	0.5	1020	904
4x-6y	25	3360	0.7	573	509	3590	0.7	634	561	3260	0.7	556	493	3460	0.7	609	542
	40	2330	0.9	191	169	2410	0.9	211	187	2220	0.9	185	164	2280	0.9	203	180
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		756	556	8.40	7.20	756	556	8.40	7.20	709	521	8.40	7.20	709	521	8.40	7.20
4.02 %	0	4470	0.0	2040	1680	4860	0.0	2220	1840	4380	0.0	1980	1630	4730	0.0	2150	1780
Ar(in²)	11	4260	0.2	1830	1520	4610	0.2	2000	1650	4160	0.2	1780	1470	4480	0.2	1930	1600
=27.00	13	4180	0.3	1600	1330	4520	0.3	1750	1450	4080	0.3	1560	1290	4380	0.3	1690	1400
	17	3980	0.4	1370	1140	4290	0.4	1500	1240	3880	0.4	1340	1100	4150	0.4	1450	1200
12-#14	21	3750	0.5	1150	947	4020	0.5	1250	1030	3640	0.5	1120	919	3880	0.5	1210	1000
4x-4y	25	3490	0.7	687	568	3710	0.7	750	619	3380	0.7	669	551	3570	0.7	725	601
	40	2370	0.9	229	189	2430	0.9	250	206	2250	0.9	223	183	2310	0.9	241	200
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		753	553	8.40	7.20	753	553	8.40	7.20	706	518	8.40	7.20	706	518	8.40	7.20

Notes : 1. $Cex = Pex(KxLx)^2/10000.$ (kip-ft²), $Cey = Pey(KyLy)^2/10000.$ (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 24

Designation		W 14 x233								W 14 x211							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.55 %	0	4270	0.0	1590	1340	5080	0.0	2100	1620	4090	0.0	1460	1270	4830	0.0	1910	1530
Ar(in²)	11	4150	0.2	1430	1210	4910	0.2	1890	1460	3970	0.2	1310	1140	4660	0.2	1720	1380
= 3.16	13	4100	0.3	1250	1060	4840	0.3	1650	1280	3930	0.3	1150	997	4600	0.3	1500	1200
	17	3980	0.4	1080	906	4680	0.4	1420	1100	3810	0.4	984	855	4440	0.4	1290	1030
4-# 8	21	3840	0.5	896	755	4480	0.5	1180	913	3670	0.5	820	712	4250	0.5	1070	860
2x-2y	25	3680	0.7	537	453	4260	0.7	708	548	3510	0.7	492	427	4030	0.7	644	516
	40	2920	0.9	179	151	3230	0.9	236	182	2760	0.9	164	142	3030	0.9	214	172
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		882	882	7.20	7.20	882	882	7.20	7.20	818	818	7.20	7.20	818	818	7.20	7.20
1.08 %	0	4360	0.0	1720	1460	5180	0.0	2220	1740	4190	0.0	1580	1390	4930	0.0	2030	1650
Ar(in²)	11	4240	0.2	1540	1320	5000	0.2	2000	1570	4070	0.2	1420	1250	4760	0.2	1830	1480
= 6.24	13	4190	0.3	1350	1150	4930	0.3	1750	1370	4020	0.3	1240	1090	4690	0.3	1600	1300
	17	4070	0.4	1160	987	4760	0.4	1500	1180	3900	0.4	1070	935	4520	0.4	1370	1110
4-#11	21	3920	0.5	964	822	4560	0.5	1250	980	3750	0.5	889	779	4320	0.5	1140	926
2x-2y	25	3750	0.7	578	493	4320	0.7	750	588	3580	0.7	533	467	4090	0.7	686	556
	40	2950	0.9	192	164	3260	0.9	250	196	2800	0.9	177	155	3060	0.9	228	185
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		881	881	7.20	7.20	881	881	7.20	7.20	817	817	7.20	7.20	817	817	7.20	7.20
2.08 %	0	4550	0.0	1920	1610	5360	0.0	2420	1890	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	4410	0.2	1730	1450	5170	0.2	2180	1700	0	0.2	0	0	0	0.2	0	0
=12.00	13	4350	0.3	1510	1270	5100	0.3	1900	1490	0	0.3	0	0	0	0.3	0	0
	17	4220	0.4	1300	1090	4920	0.4	1630	1280	0	0.4	0	0	0	0.4	0	0
20-# 7	21	4060	0.5	1080	908	4700	0.5	1360	1070	0	0.5	0	0	0	0.5	0	0
6x-6y	25	3880	0.7	647	545	4440	0.7	815	639	0	0.7	0	0	0	0.7	0	0
	40	3030	0.9	215	181	3320	0.9	271	213	0	0.9	0	0	0	0.9	0	0
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		879	879	7.20	7.20	879	879	7.20	7.20	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 24

Designation		W 14 x193								W 14 x176							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.55 %	0	3960	0.0	1350	1200	4630	0.0	1760	1450	3820	0.0	1250	1140	4440	0.0	1620	1370
Ar(in²)	11	3840	0.2	1220	1080	4470	0.2	1590	1310	3700	0.2	1130	1030	4280	0.2	1460	1240
= 3.16	13	3790	0.3	1070	948	4410	0.3	1390	1140	3660	0.3	986	898	4220	0.3	1280	1080
	17	3680	0.4	913	812	4250	0.4	1190	980	3540	0.4	845	770	4070	0.4	1100	928
4-# 8	21	3540	0.5	761	677	4060	0.5	992	816	3410	0.5	704	641	3880	0.5	913	773
2x-2y	25	3380	0.7	456	406	3850	0.7	595	490	3240	0.7	422	385	3670	0.7	548	464
	40	2630	0.9	152	135	2880	0.9	198	163	2510	0.9	140	128	2730	0.9	182	154
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		766	766	7.20	7.20	766	766	7.20	7.20	716	716	7.20	7.20	716	716	7.20	7.20
1.08 %	0	4050	0.0	1480	1320	4730	0.0	1890	1570	3920	0.0	1370	1260	4540	0.0	1750	1490
Ar(in²)	11	3930	0.2	1330	1190	4560	0.2	1700	1410	3800	0.2	1240	1140	4370	0.2	1570	1340
= 6.24	13	3880	0.3	1160	1040	4490	0.3	1490	1240	3750	0.3	1080	993	4300	0.3	1380	1180
	17	3760	0.4	996	893	4330	0.4	1270	1060	3630	0.4	927	851	4150	0.4	1180	1010
4-#11	21	3610	0.5	830	744	4140	0.5	1060	883	3480	0.5	773	709	3950	0.5	982	840
2x-2y	25	3440	0.7	498	446	3910	0.7	636	530	3310	0.7	463	425	3730	0.7	589	504
	40	2670	0.9	166	148	2910	0.9	212	176	2550	0.9	154	141	2750	0.9	196	168
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		765	765	7.20	7.20	765	765	7.20	7.20	715	715	7.20	7.20	715	715	7.20	7.20
2.08 %	0	4240	0.0	1680	1510	4910	0.0	2090	1750	4100	0.0	1580	1440	4720	0.0	1950	1670
Ar(in²)	11	4100	0.2	1510	1350	4730	0.2	1880	1570	3970	0.2	1420	1300	4540	0.2	1750	1510
=12.00	13	4040	0.3	1320	1190	4660	0.3	1650	1380	3910	0.3	1240	1140	4470	0.3	1530	1320
	17	3910	0.4	1130	1020	4480	0.4	1410	1180	3780	0.4	1060	973	4300	0.4	1320	1130
12-# 9	21	3750	0.5	944	846	4270	0.5	1180	983	3620	0.5	887	811	4090	0.5	1100	940
4x-4y	25	3570	0.7	566	508	4030	0.7	705	590	3440	0.7	532	486	3850	0.7	657	564
	40	2740	0.9	188	169	2960	0.9	235	196	2610	0.9	177	162	2800	0.9	219	188
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		763	763	7.20	7.20	763	763	7.20	7.20	713	713	7.20	7.20	713	713	7.20	7.20
3.13 %	0	4430	0.0	1830	1790	5100	0.0	2230	2030	4290	0.0	1740	1730	4910	0.0	2090	1960
Ar(in²)	11	4270	0.2	1650	1610	4900	0.2	2000	1830	4140	0.2	1560	1550	4710	0.2	1880	1760
=18.00	13	4220	0.3	1440	1410	4820	0.3	1750	1600	4080	0.3	1370	1360	4640	0.3	1650	1540
	17	4070	0.4	1240	1210	4640	0.4	1500	1370	3940	0.4	1170	1170	4450	0.4	1410	1320
8-#14	21	3900	0.5	1030	1010	4410	0.5	1250	1140	3770	0.5	977	971	4230	0.5	1180	1100
2x-4y	25	3700	0.7	618	603	4150	0.7	751	685	3570	0.7	586	582	3970	0.7	706	660
	40	2800	0.9	206	201	3010	0.9	250	228	2670	0.9	195	194	2850	0.9	235	220
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		761	761	7.20	7.20	761	761	7.20	7.20	711	711	7.20	7.20	711	711	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 24

Designation		W 14 x159								W 14 x145							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.55 %	0	3690	0.0	1150	1080	4240	0.0	1490	1300	3580	0.0	1070	1020	4090	0.0	1380	1230
Ar(in²)	11	3570	0.2	1040	968	4090	0.2	1340	1170	3460	0.2	965	918	3930	0.2	1240	1110
= 3.16	13	3520	0.3	907	847	4020	0.3	1170	1020	3420	0.3	844	803	3870	0.3	1080	968
	17	3410	0.4	778	726	3880	0.4	1000	874	3300	0.4	724	688	3730	0.4	928	829
4-# 8	21	3270	0.5	648	605	3700	0.5	836	728	3160	0.5	603	573	3550	0.5	774	691
2x-2y	25	3110	0.7	389	363	3490	0.7	501	437	3000	0.7	362	344	3350	0.7	464	414
	40	2380	0.9	129	121	2570	0.9	167	145	2280	0.9	120	114	2440	0.9	154	138
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		665	665	7.20	7.20	665	665	7.20	7.20	626	626	7.20	7.20	626	626	7.20	7.20
1.08 %	0	3790	0.0	1270	1200	4340	0.0	1610	1420	3680	0.0	1200	1140	4190	0.0	1500	1350
Ar(in²)	11	3660	0.2	1150	1080	4180	0.2	1450	1270	3550	0.2	1080	1030	4020	0.2	1350	1210
= 6.24	13	3610	0.3	1000	942	4110	0.3	1270	1110	3500	0.3	941	898	3960	0.3	1180	1060
	17	3490	0.4	860	807	3960	0.4	1090	955	3380	0.4	806	770	3810	0.4	1010	910
4-#11	21	3350	0.5	717	672	3770	0.5	904	796	3240	0.5	672	641	3620	0.5	842	758
2x-2y	25	3180	0.7	430	403	3550	0.7	542	477	3070	0.7	403	385	3410	0.7	505	455
	40	2420	0.9	143	134	2600	0.9	180	159	2310	0.9	134	128	2470	0.9	168	151
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		664	664	7.20	7.20	664	664	7.20	7.20	624	624	7.20	7.20	624	624	7.20	7.20
2.08 %	0	3970	0.0	1480	1380	4520	0.0	1810	1590	3860	0.0	1400	1320	4370	0.0	1700	1530
Ar(in²)	11	3830	0.2	1330	1240	4340	0.2	1630	1430	3720	0.2	1260	1190	4190	0.2	1530	1380
=12.00	13	3780	0.3	1160	1090	4270	0.3	1430	1260	3670	0.3	1100	1040	4120	0.3	1340	1210
	17	3640	0.4	997	930	4100	0.4	1220	1080	3540	0.4	943	892	3950	0.4	1150	1030
12-# 9	21	3480	0.5	831	775	3900	0.5	1020	896	3380	0.5	786	744	3750	0.5	956	860
4x-4y	25	3300	0.7	498	465	3670	0.7	611	537	3190	0.7	471	446	3520	0.7	574	516
	40	2480	0.9	166	155	2640	0.9	203	179	2370	0.9	157	148	2510	0.9	191	172
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		662	662	7.20	7.20	662	662	7.20	7.20	622	622	7.20	7.20	622	622	7.20	7.20
3.13 %	0	4160	0.0	1650	1660	4710	0.0	1960	1880	4050	0.0	1570	1610	4560	0.0	1860	1810
Ar(in²)	11	4000	0.2	1480	1500	4520	0.2	1770	1690	3900	0.2	1410	1450	4360	0.2	1670	1630
=18.00	13	3950	0.3	1300	1310	4440	0.3	1550	1480	3840	0.3	1240	1270	4290	0.3	1460	1430
	17	3800	0.4	1110	1120	4260	0.4	1330	1270	3690	0.4	1060	1090	4110	0.4	1260	1220
8-#14	21	3630	0.5	925	935	4040	0.5	1100	1060	3520	0.5	883	904	3890	0.5	1050	1020
2x-4y	25	3430	0.7	555	561	3780	0.7	662	633	3310	0.7	530	542	3640	0.7	627	611
	40	2530	0.9	185	187	2690	0.9	220	211	2420	0.9	176	180	2560	0.9	209	203
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		660	660	7.20	7.20	660	660	7.20	7.20	620	620	7.20	7.20	620	620	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 24

Designation		W 14 x132								W 14 x120							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.55 %	0	3480	0.0	998	956	3940	0.0	1270	1150	3390	0.0	931	906	3810	0.0	1180	1090
Ar(in²)	11	3360	0.2	898	860	3790	0.2	1150	1030	3260	0.2	838	816	3650	0.2	1060	980
= 3.16	13	3310	0.3	785	753	3730	0.3	1000	903	3220	0.3	733	714	3590	0.3	930	857
	17	3200	0.4	673	645	3580	0.4	859	774	3100	0.4	628	612	3450	0.4	797	735
4-# 8	21	3060	0.5	561	538	3410	0.5	716	645	2960	0.5	523	510	3280	0.5	664	612
2x-2y	25	2900	0.7	336	322	3210	0.7	429	387	2800	0.7	314	306	3080	0.7	398	367
	40	2180	0.9	112	107	2320	0.9	143	129	2090	0.9	104	102	2210	0.9	132	122
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		587	587	7.20	7.20	587	587	7.20	7.20	552	552	7.20	7.20	552	552	7.20	7.20
1.08 %	0	3580	0.0	1120	1080	4040	0.0	1400	1270	3480	0.0	1050	1030	3900	0.0	1300	1210
Ar(in²)	11	3450	0.2	1010	970	3880	0.2	1260	1140	3350	0.2	948	925	3740	0.2	1170	1090
= 6.24	13	3400	0.3	882	848	3810	0.3	1100	998	3310	0.3	829	809	3680	0.3	1030	952
	17	3280	0.4	756	727	3660	0.4	941	855	3180	0.4	711	694	3530	0.4	879	816
4-#11	21	3130	0.5	630	606	3480	0.5	784	713	3040	0.5	592	578	3350	0.5	733	680
2x-2y	25	2960	0.7	378	363	3270	0.7	470	427	2870	0.7	355	347	3140	0.7	439	408
	40	2210	0.9	126	121	2350	0.9	156	142	2120	0.9	118	115	2230	0.9	146	136
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		586	586	7.20	7.20	586	586	7.20	7.20	551	551	7.20	7.20	551	551	7.20	7.20
2.08 %	0	3760	0.0	1320	1260	4220	0.0	1600	1450	3670	0.0	1260	1210	4090	0.0	1510	1390
Ar(in²)	11	3620	0.2	1190	1130	4040	0.2	1440	1300	3520	0.2	1130	1090	3910	0.2	1360	1250
=12.00	13	3560	0.3	1040	991	3970	0.3	1260	1140	3470	0.3	989	952	3840	0.3	1190	1100
	17	3430	0.4	893	850	3810	0.4	1080	977	3330	0.4	848	816	3680	0.4	1020	938
12-# 9	21	3270	0.5	744	708	3610	0.5	898	814	3170	0.5	706	680	3480	0.5	847	782
4x-4y	25	3080	0.7	446	425	3380	0.7	539	488	2990	0.7	424	408	3250	0.7	508	469
	40	2260	0.9	148	141	2390	0.9	179	162	2170	0.9	141	136	2270	0.9	169	156
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		584	584	7.20	7.20	584	584	7.20	7.20	549	549	7.20	7.20	549	549	7.20	7.20
3.13 %	0	3950	0.0	1500	1550	4410	0.0	1760	1730	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	3790	0.2	1350	1390	4220	0.2	1580	1560	0	0.2	0	0	0	0.2	0	0
=18.00	13	3730	0.3	1180	1220	4140	0.3	1390	1360	0	0.3	0	0	0	0.3	0	0
	17	3580	0.4	1010	1040	3960	0.4	1190	1170	0	0.4	0	0	0	0.4	0	0
8-#14	21	3410	0.5	843	869	3740	0.5	989	974	0	0.5	0	0	0	0.5	0	0
2x-4y	25	3200	0.7	505	521	3490	0.7	593	584	0	0.7	0	0	0	0.7	0	0
	40	2310	0.9	168	173	2430	0.9	197	194	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		581	581	7.20	7.20	581	581	7.20	7.20	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 24

Designation		W 14 x109								W 14 x 99							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.55 %	0	3300	0.0	868	857	3680	0.0	1090	1030	3220	0.0	813	811	3570	0.0	1020	977
Ar(in²)	11	3180	0.2	781	771	3530	0.2	985	927	3100	0.2	732	730	3420	0.2	916	879
= 3.16	13	3130	0.3	684	675	3470	0.3	862	811	3050	0.3	640	639	3360	0.3	801	769
	17	3010	0.4	586	578	3330	0.4	738	695	2930	0.4	549	547	3220	0.4	687	659
4-# 8	21	2870	0.5	488	482	3150	0.5	615	579	2790	0.5	457	456	3050	0.5	572	549
2x-2y	25	2710	0.7	293	289	2960	0.7	369	347	2630	0.7	274	273	2850	0.7	343	329
	40	2000	0.9	97	96	2110	0.9	123	115	1920	0.9	91	91	2010	0.9	114	109
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		519	519	7.20	7.20	519	519	7.20	7.20	490	490	7.20	7.20	490	490	7.20	7.20
1.08 %	0	3400	0.0	991	979	3780	0.0	1220	1150	3320	0.0	935	933	3670	0.0	1140	1100
Ar(in²)	11	3270	0.2	892	881	3620	0.2	1100	1040	3190	0.2	842	839	3510	0.2	1030	988
= 6.24	13	3220	0.3	780	770	3550	0.3	958	906	3140	0.3	736	734	3440	0.3	898	864
	17	3090	0.4	669	660	3400	0.4	821	777	3010	0.4	631	629	3290	0.4	769	741
4-#11	21	2950	0.5	557	550	3220	0.5	684	647	2860	0.5	526	524	3120	0.5	641	617
2x-2y	25	2780	0.7	334	330	3020	0.7	410	388	2690	0.7	315	314	2910	0.7	384	370
	40	2030	0.9	111	110	2130	0.9	136	129	1950	0.9	105	104	2030	0.9	128	123
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		518	518	7.20	7.20	518	518	7.20	7.20	489	489	7.20	7.20	489	489	7.20	7.20
2.08 %	0	3580	0.0	1190	1160	3960	0.0	1420	1330	3500	0.0	1140	1120	3850	0.0	1340	1280
Ar(in²)	11	3430	0.2	1070	1040	3780	0.2	1280	1200	3350	0.2	1030	1000	3670	0.2	1210	1150
=12.00	13	3380	0.3	940	914	3710	0.3	1120	1050	3300	0.3	896	878	3600	0.3	1060	1010
	17	3240	0.4	806	783	3550	0.4	958	899	3160	0.4	768	752	3440	0.4	906	863
12-# 9	21	3080	0.5	671	652	3350	0.5	798	749	3000	0.5	640	627	3240	0.5	755	719
4x-4y	25	2890	0.7	403	391	3130	0.7	479	449	2810	0.7	384	376	3020	0.7	453	431
	40	2070	0.9	134	130	2160	0.9	159	149	1990	0.9	128	125	2070	0.9	151	143
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		516	516	7.20	7.20	516	516	7.20	7.20	487	487	7.20	7.20	487	487	7.20	7.20
3.13 %	0	3770	0.0	1460	1290	4150	0.0	1690	1460	3690	0.0	1410	1240	4040	0.0	1610	1400
Ar(in²)	11	3610	0.2	1320	1160	3950	0.2	1520	1310	3530	0.2	1270	1120	3840	0.2	1450	1260
=18.00	13	3550	0.3	1150	1010	3880	0.3	1330	1150	3460	0.3	1110	976	3770	0.3	1270	1110
	17	3390	0.4	988	867	3700	0.4	1140	984	3310	0.4	951	837	3590	0.4	1090	947
8-#14	21	3210	0.5	823	723	3480	0.5	950	820	3130	0.5	792	697	3370	0.5	907	789
4x-2y	25	3010	0.7	494	433	3240	0.7	570	492	2920	0.7	475	418	3130	0.7	544	473
	40	2120	0.9	164	144	2200	0.9	190	164	2030	0.9	158	139	2100	0.9	181	157
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		514	514	7.20	7.20	514	514	7.20	7.20	485	485	7.20	7.20	485	485	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 8.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 24

Designation		W 14 x 90								W 14 x 82							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.55 %	0	3150	0.0	763	767	3470	0.0	948	924	3090	0.0	720	725	3380	0.0	891	849
Ar(in²)	11	3030	0.2	686	690	3320	0.2	853	832	2960	0.2	648	652	3230	0.2	802	764
= 3.16	13	2980	0.3	600	604	3260	0.3	747	728	2910	0.3	567	571	3170	0.3	701	669
	17	2860	0.4	515	517	3120	0.4	640	624	2800	0.4	486	489	3030	0.4	601	573
4-# 8	21	2720	0.5	429	431	2950	0.5	533	520	2650	0.5	405	407	2860	0.5	501	477
2x-2y	25	2560	0.7	257	258	2760	0.7	320	312	2490	0.7	243	244	2670	0.7	300	286
	40	1850	0.9	85	86	1930	0.9	106	104	1780	0.9	81	81	1850	0.9	100	95
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		464	464	7.20	7.20	464	464	7.20	7.20	440	440	7.20	7.20	440	440	7.20	7.20
1.08 %	0	3250	0.0	885	888	3570	0.0	1070	1050	3190	0.0	842	846	3470	0.0	1010	970
Ar(in²)	11	3120	0.2	797	800	3410	0.2	963	941	3050	0.2	758	761	3310	0.2	912	873
= 6.24	13	3070	0.3	697	700	3340	0.3	843	823	3000	0.3	663	666	3250	0.3	798	764
	17	2940	0.4	597	600	3200	0.4	722	706	2870	0.4	568	571	3100	0.4	684	654
4-#11	21	2790	0.5	498	500	3020	0.5	602	588	2720	0.5	473	476	2930	0.5	570	545
2x-2y	25	2620	0.7	298	300	2810	0.7	361	353	2550	0.7	284	285	2720	0.7	342	327
	40	1870	0.9	99	100	1950	0.9	120	117	1800	0.9	94	95	1860	0.9	114	109
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		463	463	7.20	7.20	463	463	7.20	7.20	439	439	7.20	7.20	439	439	7.20	7.20
2.08 %	0	3430	0.0	1090	1070	3750	0.0	1270	1230	3370	0.0	1050	1030	3660	0.0	1220	1150
Ar(in²)	11	3280	0.2	979	964	3570	0.2	1150	1110	3220	0.2	941	925	3480	0.2	1090	1040
=12.00	13	3230	0.3	857	843	3500	0.3	1000	966	3160	0.3	823	809	3410	0.3	958	907
	17	3090	0.4	734	723	3340	0.4	859	828	3020	0.4	705	694	3250	0.4	821	777
12-# 9	21	2920	0.5	612	602	3140	0.5	716	690	2850	0.5	588	578	3050	0.5	684	648
4x-4y	25	2730	0.7	367	361	2920	0.7	429	414	2660	0.7	352	347	2830	0.7	410	388
	40	1910	0.9	122	120	1980	0.9	143	138	1840	0.9	117	115	1890	0.9	136	129
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		461	461	7.20	7.20	461	461	7.20	7.20	437	437	7.20	7.20	437	437	7.20	7.20
3.13 %	0	3620	0.0	1360	1200	3940	0.0	1540	1350	3560	0.0	1320	1150	3850	0.0	1490	1280
Ar(in²)	11	3460	0.2	1220	1080	3740	0.2	1390	1220	3390	0.2	1190	1040	3650	0.2	1340	1150
=18.00	13	3390	0.3	1070	943	3670	0.3	1220	1070	3320	0.3	1040	907	3570	0.3	1170	1000
	17	3240	0.4	917	808	3490	0.4	1040	912	3170	0.4	888	778	3390	0.4	1000	861
8-#14	21	3050	0.5	764	673	3270	0.5	868	760	2980	0.5	740	648	3170	0.5	836	717
4x-2y	25	2840	0.7	458	404	3020	0.7	521	456	2770	0.7	444	389	2930	0.7	501	430
	40	1950	0.9	152	134	2000	0.9	173	152	1870	0.9	148	129	1920	0.9	167	143
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		459	459	7.20	7.20	459	459	7.20	7.20	435	435	7.20	7.20	435	435	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 24

Designation		W 12 x336								W 12 x305							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.55 %	0	5070	0.0	2120	1540	6250	0.0	2800	1840	4830	0.0	1930	1460	5890	0.0	2550	1730
Ar(in²)	11	4940	0.2	1910	1380	6050	0.2	2520	1660	4700	0.2	1740	1310	5710	0.2	2290	1560
= 3.16	13	4890	0.3	1670	1210	5980	0.3	2200	1450	4650	0.3	1520	1150	5630	0.3	2010	1370
	17	4770	0.4	1430	1040	5790	0.4	1890	1240	4530	0.4	1310	982	5460	0.4	1720	1170
4-# 8	21	4620	0.5	1190	864	5570	0.5	1570	1040	4380	0.5	1090	818	5240	0.5	1430	975
2x-2y	25	4440	0.7	715	518	5310	0.7	944	621	4210	0.7	652	491	4990	0.7	859	585
	40	3620	0.9	238	172	4120	0.9	314	207	3410	0.9	217	163	3850	0.9	286	195
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1180	1180	7.20	7.20	1180	1180	7.20	7.20	1090	1090	7.20	7.20	1090	1090	7.20	7.20
1.08 %	0	5170	0.0	2240	1660	6340	0.0	2920	1960	4920	0.0	2060	1570	5990	0.0	2670	1850
Ar(in²)	11	5030	0.2	2020	1490	6140	0.2	2630	1760	4790	0.2	1850	1420	5800	0.2	2400	1670
= 6.24	13	4980	0.3	1770	1300	6070	0.3	2300	1540	4740	0.3	1620	1240	5720	0.3	2100	1460
	17	4860	0.4	1510	1120	5880	0.4	1970	1320	4620	0.4	1390	1060	5540	0.4	1800	1250
4-#11	21	4700	0.5	1260	931	5650	0.5	1640	1100	4460	0.5	1160	885	5320	0.5	1500	1040
2x-2y	25	4520	0.7	756	558	5380	0.7	985	661	4290	0.7	693	531	5060	0.7	900	625
	40	3660	0.9	252	186	4160	0.9	328	220	3450	0.9	231	177	3890	0.9	300	208
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1180	1180	7.20	7.20	1180	1180	7.20	7.20	1090	1090	7.20	7.20	1090	1090	7.20	7.20
2.17 %	0	5360	0.0	2400	1900	6540	0.0	3080	2210	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	5220	0.2	2160	1710	6330	0.2	2770	1990	0	0.2	0	0	0	0.2	0	0
=12.48	13	5170	0.3	1890	1500	6250	0.3	2430	1740	0	0.3	0	0	0	0.3	0	0
	17	5030	0.4	1620	1290	6040	0.4	2080	1490	0	0.4	0	0	0	0.4	0	0
8-#11	21	4860	0.5	1350	1070	5800	0.5	1730	1240	0	0.5	0	0	0	0.5	0	0
2x-4y	25	4660	0.7	811	642	5520	0.7	1040	744	0	0.7	0	0	0	0.7	0	0
	40	3750	0.9	270	214	4230	0.9	346	248	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1180	1180	7.20	7.20	1180	1180	7.20	7.20	0	0	.00	.00	0	0	.00	.00
3.13 %	0	5540	0.0	2550	2110	6720	0.0	3220	2410	5300	0.0	2370	2030	6360	0.0	2970	2310
Ar(in²)	11	5390	0.2	2290	1900	6490	0.2	2900	2170	5140	0.2	2130	1830	6140	0.2	2680	2080
=18.00	13	5330	0.3	2010	1660	6400	0.3	2540	1900	5090	0.3	1860	1600	6060	0.3	2340	1820
	17	5180	0.4	1720	1430	6190	0.4	2180	1630	4940	0.4	1600	1370	5850	0.4	2010	1560
8-#14	21	5000	0.5	1430	1190	5930	0.5	1810	1360	4760	0.5	1330	1140	5600	0.5	1670	1300
2x-4y	25	4790	0.7	860	713	5640	0.7	1090	814	4560	0.7	799	685	5310	0.7	1000	778
	40	3830	0.9	286	237	4290	0.9	362	271	3610	0.9	266	228	4010	0.9	334	259
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1180	1180	7.20	7.20	1180	1180	7.20	7.20	1090	1090	7.20	7.20	1090	1090	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 24

Designation		W 12 x279								W 12 x252							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.55 %	0	4620	0.0	1780	1380	5600	0.0	2330	1640	4420	0.0	1620	1310	5300	0.0	2120	1550
Ar(in²)	11	4500	0.2	1600	1250	5420	0.2	2100	1480	4290	0.2	1460	1180	5120	0.2	1910	1400
= 3.16	13	4450	0.3	1400	1090	5350	0.3	1840	1290	4250	0.3	1280	1030	5050	0.3	1670	1220
	17	4330	0.4	1200	934	5170	0.4	1570	1110	4130	0.4	1100	884	4890	0.4	1430	1050
4-# 8	21	4190	0.5	1000	778	4970	0.5	1310	924	3990	0.5	913	736	4690	0.5	1190	873
2x-2y	25	4020	0.7	600	467	4720	0.7	787	554	3820	0.7	548	442	4450	0.7	716	524
	40	3230	0.9	200	155	3630	0.9	262	184	3050	0.9	182	147	3400	0.9	238	174
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1020	1020	7.20	7.20	1020	1020	7.20	7.20	938	938	7.20	7.20	938	938	7.20	7.20
1.08 %	0	4720	0.0	1900	1500	5690	0.0	2450	1760	4510	0.0	1750	1430	5390	0.0	2240	1670
Ar(in²)	11	4590	0.2	1710	1350	5510	0.2	2210	1590	4380	0.2	1570	1290	5210	0.2	2020	1500
= 6.24	13	4540	0.3	1500	1180	5430	0.3	1930	1390	4340	0.3	1380	1130	5140	0.3	1770	1320
	17	4420	0.4	1280	1010	5260	0.4	1660	1190	4210	0.4	1180	964	4970	0.4	1510	1130
4-#11	21	4270	0.5	1070	845	5040	0.5	1380	991	4060	0.5	982	803	4760	0.5	1260	940
2x-2y	25	4090	0.7	641	507	4790	0.7	828	594	3890	0.7	589	482	4520	0.7	757	564
	40	3270	0.9	213	169	3660	0.9	276	198	3090	0.9	196	160	3430	0.9	252	188
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1020	1020	7.20	7.20	1020	1020	7.20	7.20	937	937	7.20	7.20	937	937	7.20	7.20
2.08 %	0	4900	0.0	2100	1680	5880	0.0	2660	1940	4690	0.0	1950	1610	5580	0.0	2450	1850
Ar(in²)	11	4760	0.2	1890	1510	5680	0.2	2390	1740	4560	0.2	1750	1450	5380	0.2	2200	1660
=12.00	13	4710	0.3	1660	1320	5600	0.3	2090	1530	4500	0.3	1530	1270	5310	0.3	1930	1460
	17	4580	0.4	1420	1130	5410	0.4	1790	1310	4370	0.4	1320	1080	5120	0.4	1650	1250
12-# 9	21	4410	0.5	1180	944	5180	0.5	1490	1090	4210	0.5	1100	903	4900	0.5	1380	1040
4x-4y	25	4220	0.7	709	566	4920	0.7	896	653	4020	0.7	657	542	4640	0.7	825	623
	40	3350	0.9	236	188	3720	0.9	298	217	3160	0.9	219	180	3490	0.9	275	207
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1010	1010	7.20	7.20	1010	1010	7.20	7.20	935	935	7.20	7.20	935	935	7.20	7.20
3.13 %	0	5090	0.0	2220	1960	6070	0.0	2760	2220	4880	0.0	2070	1890	5770	0.0	2550	2130
Ar(in²)	11	4940	0.2	1990	1770	5850	0.2	2480	2000	4730	0.2	1860	1700	5560	0.2	2300	1920
=18.00	13	4880	0.3	1740	1540	5770	0.3	2170	1750	4680	0.3	1630	1490	5480	0.3	2010	1680
	17	4740	0.4	1500	1320	5570	0.4	1860	1500	4530	0.4	1400	1270	5280	0.4	1720	1440
8-#14	21	4560	0.5	1250	1100	5320	0.5	1550	1250	4360	0.5	1160	1060	5040	0.5	1430	1200
2x-4y	25	4360	0.7	747	662	5040	0.7	931	748	4160	0.7	697	637	4770	0.7	860	718
	40	3420	0.9	249	220	3780	0.9	310	249	3230	0.9	232	212	3540	0.9	286	239
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1010	1010	7.20	7.20	1010	1010	7.20	7.20	933	933	7.20	7.20	933	933	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. $Cex = Pex(KxLx)^2/10000.$ (kip-ft²), $Cey = Pey(KyLy)^2/10000.$ (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 8.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 24 x 24

Designation		W 12 x230								W 12 x210							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.55 %	0	4250	0.0	1500	1250	5050	0.0	1950	1480	4090	0.0	1390	1190	4820	0.0	1790	1410
Ar(in²)	11	4120	0.2	1350	1120	4880	0.2	1760	1330	3970	0.2	1250	1070	4660	0.2	1610	1270
= 3.16	13	4080	0.3	1180	983	4810	0.3	1540	1160	3920	0.3	1090	937	4590	0.3	1410	1110
	17	3960	0.4	1010	842	4650	0.4	1320	997	3810	0.4	936	803	4440	0.4	1210	948
4-# 8	21	3820	0.5	844	702	4460	0.5	1100	831	3670	0.5	780	669	4240	0.5	1010	790
2x-2y	25	3660	0.7	506	421	4230	0.7	658	498	3500	0.7	468	401	4020	0.7	605	474
	40	2900	0.9	168	140	3200	0.9	219	166	2760	0.9	156	133	3030	0.9	201	158
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		874	874	7.20	7.20	874	874	7.20	7.20	816	816	7.20	7.20	816	816	7.20	7.20
1.08 %	0	4340	0.0	1620	1370	5150	0.0	2070	1600	4190	0.0	1510	1310	4920	0.0	1920	1520
Ar(in²)	11	4220	0.2	1460	1230	4970	0.2	1870	1440	4060	0.2	1360	1180	4750	0.2	1720	1370
= 6.24	13	4170	0.3	1280	1080	4900	0.3	1630	1260	4010	0.3	1190	1030	4680	0.3	1510	1200
	17	4050	0.4	1100	923	4730	0.4	1400	1080	3890	0.4	1020	883	4520	0.4	1290	1030
4-#11	21	3900	0.5	913	769	4530	0.5	1170	897	3740	0.5	849	736	4320	0.5	1080	857
2x-2y	25	3730	0.7	547	461	4290	0.7	699	538	3570	0.7	509	441	4090	0.7	646	514
	40	2940	0.9	182	153	3240	0.9	233	179	2790	0.9	169	147	3060	0.9	215	171
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		873	873	7.20	7.20	873	873	7.20	7.20	815	815	7.20	7.20	815	815	7.20	7.20
2.08 %	0	4520	0.0	1830	1550	5330	0.0	2280	1770	4370	0.0	1710	1490	5100	0.0	2120	1700
Ar(in²)	11	4390	0.2	1640	1390	5140	0.2	2050	1600	4230	0.2	1540	1340	4920	0.2	1910	1530
=12.00	13	4330	0.3	1440	1220	5070	0.3	1790	1400	4180	0.3	1350	1170	4840	0.3	1670	1340
	17	4200	0.4	1230	1040	4890	0.4	1540	1200	4050	0.4	1160	1000	4670	0.4	1430	1150
12-# 9	21	4040	0.5	1030	869	4670	0.5	1280	996	3890	0.5	963	836	4450	0.5	1190	956
4x-4y	25	3860	0.7	616	521	4420	0.7	767	598	3700	0.7	577	501	4210	0.7	714	573
	40	3010	0.9	205	173	3290	0.9	255	199	2860	0.9	192	167	3110	0.9	238	191
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		871	871	7.20	7.20	871	871	7.20	7.20	813	813	7.20	7.20	813	813	7.20	7.20
3.13 %	0	4710	0.0	1950	1830	5520	0.0	2390	2050	4560	0.0	1840	1770	5290	0.0	2240	1980
Ar(in²)	11	4560	0.2	1760	1650	5320	0.2	2150	1850	4410	0.2	1660	1590	5090	0.2	2010	1780
=18.00	13	4510	0.3	1540	1440	5240	0.3	1880	1620	4350	0.3	1450	1390	5010	0.3	1760	1560
	17	4360	0.4	1320	1230	5040	0.4	1610	1390	4210	0.4	1240	1200	4820	0.4	1510	1340
8-#14	21	4190	0.5	1100	1030	4810	0.5	1340	1160	4030	0.5	1040	996	4590	0.5	1260	1120
2x-4y	25	3990	0.7	658	617	4540	0.7	805	693	3830	0.7	621	597	4330	0.7	754	669
	40	3080	0.9	219	205	3350	0.9	268	231	2930	0.9	207	199	3170	0.9	251	223
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		869	869	7.20	7.20	869	869	7.20	7.20	810	810	7.20	7.20	810	810	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 24

Designation		W 12 x190								W 12 x170							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.55 %	0	3930	0.0	1280	1130	4590	0.0	1640	1330	3780	0.0	1170	1070	4370	0.0	1490	1260
Ar(in²)	11	3810	0.2	1150	1020	4430	0.2	1480	1200	3660	0.2	1050	959	4210	0.2	1340	1130
= 3.16	13	3760	0.3	1010	888	4370	0.3	1290	1050	3610	0.3	920	839	4150	0.3	1180	989
	17	3650	0.4	862	761	4210	0.4	1110	898	3500	0.4	789	719	4000	0.4	1010	848
4-# 8	21	3510	0.5	718	634	4030	0.5	923	749	3360	0.5	657	599	3820	0.5	839	706
2x-2y	25	3350	0.7	431	380	3810	0.7	553	449	3200	0.7	394	359	3610	0.7	503	424
	40	2610	0.9	143	126	2850	0.9	184	149	2470	0.9	131	119	2670	0.9	167	141
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		756	756	7.20	7.20	756	756	7.20	7.20	698	698	7.20	7.20	698	698	7.20	7.20
1.08 %	0	4030	0.0	1400	1250	4690	0.0	1760	1450	3870	0.0	1290	1190	4470	0.0	1610	1380
Ar(in²)	11	3900	0.2	1260	1120	4520	0.2	1590	1310	3750	0.2	1160	1070	4300	0.2	1450	1240
= 6.24	13	3850	0.3	1100	982	4450	0.3	1390	1140	3700	0.3	1020	933	4240	0.3	1270	1080
	17	3730	0.4	944	842	4290	0.4	1190	979	3580	0.4	871	800	4080	0.4	1090	928
4-#11	21	3590	0.5	786	702	4100	0.5	991	815	3430	0.5	726	666	3890	0.5	907	773
2x-2y	25	3420	0.7	472	421	3880	0.7	594	489	3260	0.7	435	400	3670	0.7	544	464
	40	2650	0.9	157	140	2880	0.9	198	163	2500	0.9	145	133	2700	0.9	181	154
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		755	755	7.20	7.20	755	755	7.20	7.20	697	697	7.20	7.20	697	697	7.20	7.20
2.08 %	0	4210	0.0	1600	1430	4870	0.0	1960	1630	4060	0.0	1490	1370	4650	0.0	1820	1550
Ar(in²)	11	4070	0.2	1440	1290	4690	0.2	1770	1460	3920	0.2	1340	1230	4470	0.2	1630	1400
=12.00	13	4020	0.3	1260	1130	4620	0.3	1550	1280	3860	0.3	1180	1080	4400	0.3	1430	1220
	17	3890	0.4	1080	964	4440	0.4	1330	1100	3730	0.4	1010	922	4230	0.4	1230	1050
12-# 9	21	3730	0.5	900	803	4230	0.5	1110	915	3570	0.5	839	768	4020	0.5	1020	873
4x-4y	25	3540	0.7	540	482	3990	0.7	663	549	3390	0.7	503	461	3790	0.7	612	524
	40	2710	0.9	180	160	2930	0.9	221	183	2560	0.9	167	153	2750	0.9	204	174
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		753	753	7.20	7.20	753	753	7.20	7.20	695	695	7.20	7.20	695	695	7.20	7.20
3.13 %	0	4400	0.0	1870	1550	5060	0.0	2230	1750	4250	0.0	1760	1490	4840	0.0	2080	1680
Ar(in²)	11	4250	0.2	1680	1400	4860	0.2	2010	1580	4090	0.2	1590	1340	4640	0.2	1880	1510
=18.00	13	4190	0.3	1470	1220	4790	0.3	1760	1380	4030	0.3	1390	1170	4570	0.3	1640	1320
	17	4050	0.4	1260	1050	4600	0.4	1510	1180	3890	0.4	1190	1010	4380	0.4	1410	1130
8-#14	21	3870	0.5	1050	873	4370	0.5	1260	986	3720	0.5	991	838	4160	0.5	1170	944
4x-2y	25	3670	0.7	631	524	4110	0.7	753	592	3520	0.7	594	503	3900	0.7	703	566
	40	2770	0.9	210	174	2980	0.9	251	197	2620	0.9	198	167	2790	0.9	234	188
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		751	751	7.20	7.20	751	751	7.20	7.20	693	693	7.20	7.20	693	693	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 24

Designation		W 12 x152								W 12 x136							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.55 %	0	3640	0.0	1070	1010	4170	0.0	1360	1190	3510	0.0	987	947	3980	0.0	1240	1120
Ar(in²)	11	3520	0.2	966	905	4010	0.2	1220	1070	3390	0.2	888	852	3830	0.2	1120	1010
= 3.16	13	3470	0.3	845	792	3950	0.3	1070	933	3340	0.3	777	745	3770	0.3	977	880
	17	3360	0.4	724	679	3800	0.4	918	800	3230	0.4	666	639	3620	0.4	838	754
4-# 8	21	3220	0.5	603	565	3620	0.5	765	666	3090	0.5	555	532	3450	0.5	698	628
2x-2y	25	3060	0.7	362	339	3420	0.7	459	400	2930	0.7	333	319	3240	0.7	419	377
	40	2330	0.9	120	113	2510	0.9	153	133	2210	0.9	111	106	2360	0.9	139	125
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		645	645	7.20	7.20	645	645	7.20	7.20	598	598	7.20	7.20	598	598	7.20	7.20
1.08 %	0	3730	0.0	1200	1130	4260	0.0	1480	1300	3610	0.0	1110	1070	4080	0.0	1360	1240
Ar(in²)	11	3610	0.2	1080	1010	4100	0.2	1330	1170	3480	0.2	998	961	3920	0.2	1230	1110
= 6.24	13	3560	0.3	941	886	4040	0.3	1170	1030	3430	0.3	873	841	3850	0.3	1070	974
	17	3440	0.4	807	760	3880	0.4	1000	880	3310	0.4	748	721	3700	0.4	920	835
4-#11	21	3290	0.5	672	633	3690	0.5	833	734	3160	0.5	624	600	3520	0.5	766	696
2x-2y	25	3120	0.7	403	380	3480	0.7	500	440	2990	0.7	374	360	3310	0.7	460	417
	40	2370	0.9	134	126	2530	0.9	166	146	2240	0.9	124	120	2380	0.9	153	139
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		644	644	7.20	7.20	644	644	7.20	7.20	597	597	7.20	7.20	597	597	7.20	7.20
2.08 %	0	3910	0.0	1400	1310	4450	0.0	1680	1480	3790	0.0	1310	1250	4260	0.0	1570	1420
Ar(in²)	11	3780	0.2	1260	1180	4270	0.2	1520	1330	3650	0.2	1180	1120	4080	0.2	1410	1280
=12.00	13	3720	0.3	1100	1030	4200	0.3	1330	1170	3590	0.3	1030	983	4020	0.3	1230	1120
	17	3590	0.4	943	882	4030	0.4	1140	1000	3460	0.4	885	843	3850	0.4	1060	957
12-# 9	21	3430	0.5	786	735	3830	0.5	947	834	3300	0.5	737	702	3650	0.5	880	797
4x-4y	25	3250	0.7	471	441	3590	0.7	568	500	3110	0.7	442	421	3420	0.7	528	478
	40	2420	0.9	157	147	2580	0.9	189	166	2290	0.9	147	140	2420	0.9	176	159
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		642	642	7.20	7.20	642	642	7.20	7.20	595	595	7.20	7.20	595	595	7.20	7.20
3.13 %	0	4100	0.0	1670	1430	4640	0.0	1950	1610	3980	0.0	1580	1370	4450	0.0	1830	1540
Ar(in²)	11	3950	0.2	1500	1290	4440	0.2	1760	1450	3820	0.2	1420	1240	4260	0.2	1650	1390
=18.00	13	3890	0.3	1310	1130	4370	0.3	1540	1270	3760	0.3	1240	1080	4180	0.3	1440	1210
	17	3750	0.4	1130	966	4180	0.4	1320	1090	3620	0.4	1070	927	4000	0.4	1240	1040
8-#14	21	3570	0.5	937	805	3960	0.5	1100	905	3440	0.5	889	772	3780	0.5	1030	867
4x-2y	25	3370	0.7	562	483	3710	0.7	659	543	3240	0.7	533	463	3530	0.7	618	520
	40	2480	0.9	187	161	2620	0.9	219	181	2340	0.9	177	154	2460	0.9	206	173
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		640	640	7.20	7.20	640	640	7.20	7.20	592	592	7.20	7.20	592	592	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes :
1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 24

Designation		W 12 x120								W 12 x106							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.55 %	0	3390	0.0	905	887	3810	0.0	1130	1050	3280	0.0	834	830	3650	0.0	1030	983
Ar(in^2)	11	3260	0.2	815	798	3650	0.2	1020	943	3150	0.2	751	747	3500	0.2	928	885
= 3.16	13	3220	0.3	713	698	3590	0.3	889	825	3110	0.3	657	653	3440	0.3	812	774
	17	3100	0.4	611	598	3450	0.4	762	707	2990	0.4	563	560	3300	0.4	696	664
4-# 8	21	2960	0.5	509	499	3280	0.5	635	589	2850	0.5	469	466	3130	0.5	580	553
2x-2y	25	2800	0.7	305	299	3080	0.7	381	353	2690	0.7	281	280	2930	0.7	348	332
	40	2090	0.9	101	99	2210	0.9	127	117	1980	0.9	93	93	2080	0.9	116	110
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		552	552	7.20	7.20	552	552	7.20	7.20	511	511	7.20	7.20	511	511	7.20	7.20
1.08 %	0	3480	0.0	1030	1010	3900	0.0	1250	1170	3370	0.0	956	951	3750	0.0	1150	1100
Ar(in^2)	11	3350	0.2	924	907	3740	0.2	1130	1050	3240	0.2	861	856	3590	0.2	1040	993
= 6.24	13	3310	0.3	809	793	3680	0.3	984	920	3190	0.3	753	749	3520	0.3	908	869
	17	3180	0.4	693	680	3530	0.4	844	788	3070	0.4	645	642	3370	0.4	778	745
4-#11	21	3040	0.5	578	567	3350	0.5	703	657	2920	0.5	538	535	3190	0.5	648	621
2x-2y	25	2870	0.7	346	340	3140	0.7	422	394	2750	0.7	322	321	2990	0.7	389	372
	40	2120	0.9	115	113	2230	0.9	140	131	2000	0.9	107	107	2100	0.9	129	124
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		551	551	7.20	7.20	551	551	7.20	7.20	510	510	7.20	7.20	510	510	7.20	7.20
2.08 %	0	3670	0.0	1230	1190	4090	0.0	1450	1350	3560	0.0	1160	1130	3930	0.0	1360	1290
Ar(in^2)	11	3520	0.2	1110	1070	3910	0.2	1310	1220	3410	0.2	1040	1020	3750	0.2	1220	1160
=12.00	13	3470	0.3	968	937	3840	0.3	1140	1060	3360	0.3	912	892	3680	0.3	1070	1010
	17	3330	0.4	830	803	3680	0.4	980	911	3220	0.4	782	765	3520	0.4	914	867
12-# 9	21	3170	0.5	691	669	3480	0.5	817	759	3060	0.5	652	637	3320	0.5	762	723
4x-4y	25	2990	0.7	415	401	3250	0.7	490	455	2870	0.7	391	382	3100	0.7	457	433
	40	2170	0.9	138	133	2270	0.9	163	151	2050	0.9	130	127	2140	0.9	152	144
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		549	549	7.20	7.20	549	549	7.20	7.20	508	508	7.20	7.20	508	508	7.20	7.20
3.13 %	0	3860	0.0	1500	1310	4280	0.0	1720	1470	3750	0.0	1430	1260	4120	0.0	1620	1410
Ar(in^2)	11	3700	0.2	1350	1180	4080	0.2	1550	1330	3590	0.2	1290	1130	3920	0.2	1460	1270
=18.00	13	3640	0.3	1180	1030	4010	0.3	1360	1160	3520	0.3	1120	990	3850	0.3	1280	1110
	17	3490	0.4	1010	887	3830	0.4	1160	995	3370	0.4	963	849	3670	0.4	1100	951
8-#14	21	3310	0.5	843	739	3610	0.5	968	829	3190	0.5	803	707	3450	0.5	913	792
4x-2y	25	3100	0.7	505	443	3360	0.7	580	497	2980	0.7	481	424	3210	0.7	548	475
	40	2210	0.9	168	147	2310	0.9	193	165	2090	0.9	160	141	2170	0.9	182	158
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		547	547	7.20	7.20	547	547	7.20	7.20	506	506	7.20	7.20	506	506	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in^2)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 24

Designation		W 12 x 96								W 12 x 87							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.55 %	0	3200	0.0	784	787	3530	0.0	961	933	3130	0.0	739	746	3430	0.0	900	887
Ar(in²)	11	3070	0.2	705	708	3380	0.2	865	840	3000	0.2	665	671	3280	0.2	810	798
= 3.16	13	3030	0.3	617	619	3320	0.3	757	735	2960	0.3	582	587	3220	0.3	708	698
	17	2910	0.4	529	531	3180	0.4	649	630	2840	0.4	499	503	3080	0.4	607	598
4-# 8	21	2770	0.5	441	442	3010	0.5	540	525	2700	0.5	416	419	2920	0.5	506	498
2x-2y	25	2610	0.7	264	265	2820	0.7	324	315	2530	0.7	249	251	2720	0.7	303	299
	40	1900	0.9	88	88	1980	0.9	108	105	1820	0.9	83	83	1900	0.9	101	99
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		481	481	7.20	7.20	481	481	7.20	7.20	455	455	7.20	7.20	455	455	7.20	7.20
1.08 %	0	3300	0.0	906	908	3630	0.0	1080	1050	3230	0.0	861	868	3530	0.0	1020	1010
Ar(in²)	11	3160	0.2	815	817	3470	0.2	974	949	3090	0.2	775	781	3370	0.2	919	907
= 6.24	13	3110	0.3	713	715	3410	0.3	853	830	3040	0.3	678	683	3310	0.3	804	794
	17	2990	0.4	611	613	3260	0.4	731	712	2920	0.4	581	586	3160	0.4	689	680
4-#11	21	2840	0.5	509	510	3080	0.5	609	593	2770	0.5	484	488	2980	0.5	574	567
2x-2y	25	2670	0.7	305	306	2880	0.7	365	356	2590	0.7	290	293	2780	0.7	344	340
	40	1920	0.9	101	102	2000	0.9	121	118	1840	0.9	96	97	1920	0.9	114	113
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		480	480	7.20	7.20	480	480	7.20	7.20	454	454	7.20	7.20	454	454	7.20	7.20
2.08 %	0	3480	0.0	1110	1090	3810	0.0	1290	1240	3410	0.0	1060	1050	3710	0.0	1220	1190
Ar(in²)	11	3330	0.2	997	981	3640	0.2	1160	1110	3260	0.2	957	945	3540	0.2	1100	1070
=12.00	13	3270	0.3	873	858	3570	0.3	1010	973	3200	0.3	837	827	3470	0.3	964	936
	17	3140	0.4	748	736	3400	0.4	867	834	3060	0.4	718	709	3300	0.4	826	803
12-# 9	21	2970	0.5	623	613	3210	0.5	723	695	2890	0.5	598	591	3110	0.5	688	669
4x-4y	25	2780	0.7	374	368	2980	0.7	433	417	2700	0.7	359	354	2880	0.7	413	401
	40	1960	0.9	124	122	2040	0.9	144	139	1880	0.9	119	118	1950	0.9	137	133
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		478	478	7.20	7.20	478	478	7.20	7.20	452	452	7.20	7.20	452	452	7.20	7.20
3.13 %	0	3670	0.0	1380	1220	4000	0.0	1550	1360	3600	0.0	1330	1180	3900	0.0	1490	1310
Ar(in²)	11	3500	0.2	1240	1090	3810	0.2	1400	1220	3430	0.2	1200	1060	3710	0.2	1340	1180
=18.00	13	3440	0.3	1090	957	3730	0.3	1220	1070	3370	0.3	1050	925	3630	0.3	1180	1040
	17	3290	0.4	930	820	3550	0.4	1050	918	3210	0.4	899	793	3450	0.4	1010	887
8-#14	21	3100	0.5	775	683	3340	0.5	874	765	3030	0.5	749	661	3230	0.5	839	739
4x-2y	25	2890	0.7	465	410	3090	0.7	524	459	2810	0.7	449	396	2990	0.7	503	443
	40	2000	0.9	155	136	2070	0.9	174	153	1920	0.9	149	132	1970	0.9	167	147
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		476	476	7.20	7.20	476	476	7.20	7.20	450	450	7.20	7.20	450	450	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 24

Designation		W 12 x 79								W							
Fy (ksi)		36				50											
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy								
.55 %	0	3070	0.0	699	707	3340	0.0	845	843								
Ar(in²)	11	2940	0.2	629	637	3190	0.2	760	758								
= 3.16	13	2890	0.3	551	557	3130	0.3	665	663								
	17	2770	0.4	472	477	2990	0.4	570	569								
4-# 8	21	2630	0.5	393	398	2820	0.5	475	474								
2x-2y	25	2460	0.7	236	238	2630	0.7	285	284								
	40	1750	0.9	78	79	1820	0.9	95	94								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		431	431	7.20	7.20	431	431	7.20	7.20								
1.08 %	0	3160	0.0	821	830	3440	0.0	967	964								
Ar(in²)	11	3030	0.2	739	747	3280	0.2	870	867								
= 6.24	13	2980	0.3	647	653	3220	0.3	761	759								
	17	2850	0.4	554	560	3070	0.4	652	650								
4-#11	21	2700	0.5	462	466	2890	0.5	543	542								
2x-2y	25	2520	0.7	277	280	2690	0.7	326	325								
	40	1770	0.9	92	93	1830	0.9	108	108								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		430	430	7.20	7.20	430	430	7.20	7.20								
2.08 %	0	3340	0.0	1020	1010	3620	0.0	1170	1150								
Ar(in²)	11	3190	0.2	921	910	3440	0.2	1050	1030								
=12.00	13	3130	0.3	806	797	3380	0.3	920	902								
	17	2990	0.4	691	683	3210	0.4	789	773								
12-# 9	21	2820	0.5	576	569	3010	0.5	657	644								
4x-4y	25	2630	0.7	345	341	2790	0.7	394	386								
	40	1810	0.9	115	113	1860	0.9	131	128								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		428	428	7.20	7.20	428	428	7.20	7.20								
3.13 %	0	3530	0.0	1290	1140	3810	0.0	1440	1270								
Ar(in²)	11	3360	0.2	1160	1020	3610	0.2	1290	1140								
=18.00	13	3300	0.3	1020	896	3540	0.3	1130	1000								
	17	3140	0.4	872	768	3360	0.4	970	857								
8-#14	21	2950	0.5	727	640	3140	0.5	808	714								
4x-2y	25	2740	0.7	436	384	2890	0.7	485	428								
	40	1840	0.9	145	128	1890	0.9	161	142								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		426	426	7.20	7.20	426	426	7.20	7.20								
.00 %	0	0	0.0	0	0	0	0.0	0	0								
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0								
= .00	13	0	0.3	0	0	0	0.3	0	0								
	17	0	0.4	0	0	0	0.4	0	0								
0-# 0	21	0	0.5	0	0	0	0.5	0	0								
0x-0y	25	0	0.7	0	0	0	0.7	0	0								
	40	0	0.9	0	0	0	0.9	0	0								
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00								

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 24

Designation		W 10 x112								W 10 x100							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.55 %	0	3320	0.0	849	847	3710	0.0	1030	988	3230	0.0	796	801	3580	0.0	957	936
Ar(in²)	11	3200	0.2	764	762	3560	0.2	927	889	3110	0.2	716	721	3430	0.2	861	843
= 3.16	13	3150	0.3	669	667	3500	0.3	811	778	3060	0.3	627	631	3370	0.3	753	737
	17	3040	0.4	573	571	3360	0.4	695	667	2940	0.4	537	541	3230	0.4	646	632
4-# 8	21	2900	0.5	477	476	3190	0.5	579	556	2800	0.5	448	450	3060	0.5	538	526
2x-2y	25	2740	0.7	286	285	2990	0.7	347	333	2640	0.7	268	270	2860	0.7	323	316
	40	2020	0.9	95	95	2130	0.9	115	111	1930	0.9	89	90	2020	0.9	107	105
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		528	528	7.20	7.20	528	528	7.20	7.20	493	493	7.20	7.20	493	493	7.20	7.20
1.08 %	0	3420	0.0	970	967	3810	0.0	1150	1110	3330	0.0	917	922	3680	0.0	1080	1060
Ar(in²)	11	3290	0.2	873	871	3650	0.2	1040	997	3200	0.2	825	830	3520	0.2	970	951
= 6.24	13	3240	0.3	764	762	3590	0.3	906	872	3150	0.3	722	726	3460	0.3	849	832
	17	3120	0.4	655	653	3440	0.4	777	748	3020	0.4	619	622	3310	0.4	727	713
4-#11	21	2970	0.5	545	544	3260	0.5	647	623	2870	0.5	516	518	3130	0.5	606	594
2x-2y	25	2800	0.7	327	326	3050	0.7	388	374	2700	0.7	309	311	2920	0.7	363	356
	40	2050	0.9	109	108	2160	0.9	129	124	1950	0.9	103	103	2040	0.9	121	118
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		527	527	7.20	7.20	527	527	7.20	7.20	492	492	7.20	7.20	492	492	7.20	7.20
2.08 %	0	3600	0.0	1170	1150	3990	0.0	1350	1290	3510	0.0	1120	1100	3860	0.0	1280	1240
Ar(in²)	11	3460	0.2	1060	1030	3820	0.2	1220	1160	3360	0.2	1010	993	3680	0.2	1150	1110
=12.00	13	3400	0.3	923	905	3750	0.3	1070	1020	3310	0.3	881	869	3610	0.3	1010	974
	17	3270	0.4	791	776	3580	0.4	913	870	3170	0.4	755	745	3450	0.4	864	835
12-# 9	21	3100	0.5	659	646	3390	0.5	761	725	3000	0.5	629	621	3250	0.5	720	696
4x-4y	25	2920	0.7	395	388	3160	0.7	456	435	2820	0.7	377	372	3030	0.7	432	417
	40	2100	0.9	131	129	2190	0.9	152	145	2000	0.9	125	124	2080	0.9	144	139
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		525	525	7.20	7.20	525	525	7.20	7.20	490	490	7.20	7.20	490	490	7.20	7.20
3.13 %	0	3790	0.0	1440	1270	4180	0.0	1620	1410	3700	0.0	1390	1230	4050	0.0	1550	1360
Ar(in²)	11	3630	0.2	1300	1150	3990	0.2	1460	1270	3540	0.2	1250	1110	3850	0.2	1390	1230
=18.00	13	3570	0.3	1130	1000	3910	0.3	1280	1110	3470	0.3	1090	967	3780	0.3	1220	1070
	17	3420	0.4	972	859	3730	0.4	1090	954	3320	0.4	936	829	3600	0.4	1040	919
8-#14	21	3240	0.5	810	716	3520	0.5	910	795	3140	0.5	780	691	3380	0.5	870	766
4x-2y	25	3030	0.7	486	429	3270	0.7	546	477	2930	0.7	468	414	3140	0.7	522	459
	40	2140	0.9	162	143	2230	0.9	182	159	2040	0.9	156	138	2110	0.9	174	153
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		523	523	7.20	7.20	523	523	7.20	7.20	488	488	7.20	7.20	488	488	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 24

Designation		W 10 x 88								W							
Fy (ksi)		36				50											
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy								
.55 %	0	3140	0.0	744	752	3450	0.0	886	881								
Ar(in²)	11	3010	0.2	670	677	3290	0.2	797	793								
= 3.16	13	2960	0.3	586	592	3240	0.3	697	694								
	17	2850	0.4	502	508	3100	0.4	598	595								
4-# 8	21	2700	0.5	418	423	2930	0.5	498	495								
2x-2y	25	2540	0.7	251	254	2730	0.7	299	297								
	40	1830	0.9	83	84	1910	0.9	99	99								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		458	458	7.20	7.20	458	458	7.20	7.20								
1.08 %	0	3230	0.0	866	874	3540	0.0	1010	1000								
Ar(in²)	11	3100	0.2	779	786	3380	0.2	906	901								
= 6.24	13	3050	0.3	682	688	3320	0.3	793	789								
	17	2920	0.4	584	590	3170	0.4	680	676								
4-#11	21	2770	0.5	487	491	2990	0.5	566	563								
2x-2y	25	2600	0.7	292	295	2790	0.7	340	338								
	40	1850	0.9	97	98	1930	0.9	113	112								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		457	457	7.20	7.20	457	457	7.20	7.20								
2.08 %	0	3420	0.0	1070	1060	3720	0.0	1210	1180								
Ar(in²)	11	3270	0.2	961	950	3550	0.2	1090	1070								
=12.00	13	3210	0.3	841	831	3480	0.3	952	932								
	17	3070	0.4	721	712	3320	0.4	816	799								
12-# 9	21	2900	0.5	600	594	3120	0.5	680	665								
4x-4y	25	2710	0.7	360	356	2900	0.7	408	399								
	40	1890	0.9	120	118	1960	0.9	136	133								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		455	455	7.20	7.20	455	455	7.20	7.20								
3.13 %	0	3610	0.0	1340	1180	3910	0.0	1480	1310								
Ar(in²)	11	3440	0.2	1200	1060	3720	0.2	1330	1180								
=18.00	13	3380	0.3	1050	930	3640	0.3	1160	1030								
	17	3220	0.4	901	797	3460	0.4	996	882								
8-#14	21	3030	0.5	751	664	3250	0.5	830	735								
4x-2y	25	2820	0.7	450	398	3000	0.7	498	441								
	40	1930	0.9	150	132	1980	0.9	166	147								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		453	453	7.20	7.20	453	453	7.20	7.20								
.00 %	0	0	0.0	0	0	0	0.0	0	0								
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0								
= .00	13	0	0.3	0	0	0	0.3	0	0								
	17	0	0.4	0	0	0	0.4	0	0								
0-# 0	21	0	0.5	0	0	0	0.5	0	0								
0x-0y	25	0	0.7	0	0	0	0.7	0	0								
	40	0	0.9	0	0	0	0.9	0	0								
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00								

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 24

Designation		W 14 x145								W 14 x132							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.50 %	0	3170	0.0	1020	814	3670	0.0	1320	1000	3060	0.0	940	755	3520	0.0	1210	924
Ar(in²)	11	3020	0.2	913	733	3480	0.2	1190	900	2920	0.2	846	680	3340	0.2	1090	831
= 2.40	13	2970	0.3	799	641	3410	0.3	1040	788	2870	0.3	740	595	3270	0.3	956	727
	17	2840	0.4	685	549	3240	0.4	889	675	2730	0.4	635	510	3090	0.4	819	623
4-# 7	21	2680	0.5	570	458	3030	0.5	740	562	2580	0.5	529	425	2890	0.5	683	519
2x-2y	25	2500	0.7	342	274	2790	0.7	444	337	2400	0.7	317	255	2660	0.7	409	311
	40	1730	0.9	114	91	1820	0.9	148	112	1640	0.9	105	85	1710	0.9	136	103
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		592	411	7.20	6.00	592	411	7.20	6.00	553	384	7.20	6.00	553	384	7.20	6.00
1.00 %	0	3240	0.0	1120	862	3750	0.0	1420	1050	3140	0.0	1040	803	3600	0.0	1320	971
Ar(in²)	11	3090	0.2	1010	776	3550	0.2	1280	943	2990	0.2	939	723	3410	0.2	1190	874
= 4.80	13	3040	0.3	880	679	3480	0.3	1120	825	2930	0.3	821	633	3330	0.3	1040	765
	17	2900	0.4	754	582	3290	0.4	958	707	2790	0.4	704	542	3150	0.4	888	656
8-# 7	21	2730	0.5	628	485	3080	0.5	798	589	2630	0.5	586	452	2940	0.5	740	546
4x-2y	25	2540	0.7	377	291	2830	0.7	479	353	2440	0.7	352	271	2700	0.7	444	328
	40	1740	0.9	125	97	1830	0.9	159	117	1650	0.9	117	90	1720	0.9	148	109
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		591	410	7.20	6.00	591	410	7.20	6.00	552	383	7.20	6.00	552	383	7.20	6.00
2.12 %	0	3410	0.0	1340	970	3920	0.0	1640	1160	3310	0.0	1260	911	3770	0.0	1540	1080
Ar(in²)	11	3250	0.2	1200	873	3700	0.2	1480	1040	3140	0.2	1140	820	3560	0.2	1380	970
=10.16	13	3180	0.3	1050	764	3620	0.3	1290	909	3080	0.3	995	717	3470	0.3	1210	849
	17	3030	0.4	903	654	3420	0.4	1110	779	2930	0.4	853	615	3280	0.4	1040	727
8-#10	21	2850	0.5	752	545	3180	0.5	922	649	2740	0.5	711	512	3040	0.5	864	606
4x-2y	25	2640	0.7	451	327	2920	0.7	553	389	2540	0.7	426	307	2780	0.7	518	363
	40	1770	0.9	150	109	1840	0.9	184	129	1670	0.9	142	102	1730	0.9	172	121
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		589	409	7.20	6.00	589	409	7.20	6.00	551	382	7.20	6.00	551	382	7.20	6.00
2.60 %	0	3490	0.0	1430	1040	3990	0.0	1730	1220	3380	0.0	1350	980	3840	0.0	1620	1150
Ar(in²)	11	3310	0.2	1280	935	3770	0.2	1550	1100	3210	0.2	1220	882	3620	0.2	1460	1030
=12.48	13	3250	0.3	1120	818	3680	0.3	1360	964	3140	0.3	1060	772	3540	0.3	1280	903
	17	3090	0.4	962	701	3480	0.4	1170	826	2980	0.4	912	661	3330	0.4	1100	774
8-#11	21	2900	0.5	801	584	3230	0.5	971	688	2790	0.5	760	551	3090	0.5	913	645
4x-2y	25	2680	0.7	481	350	2960	0.7	583	413	2580	0.7	456	330	2820	0.7	548	387
	40	1780	0.9	160	116	1850	0.9	194	137	1680	0.9	152	110	1740	0.9	182	129
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		589	409	7.20	6.00	589	409	7.20	6.00	550	382	7.20	6.00	550	382	7.20	6.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85　f'c : 8.0 ksi NW
ϕb = 0.90　Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)　Column Size(b x h): 20 x 24

Designation		W 14 x120								W 14 x109							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	2970	0.0	874	713	3390	0.0	1120	871	2880	0.0	811	670	3260	0.0	1040	821
Ar(in²)	11	2830	0.2	786	641	3210	0.2	1010	784	2740	0.2	730	603	3080	0.2	932	738
= 2.40	13	2770	0.3	688	561	3140	0.3	883	686	2690	0.3	639	528	3010	0.3	816	646
	17	2640	0.4	590	481	2970	0.4	757	588	2550	0.4	548	452	2840	0.4	699	554
4-# 7	21	2480	0.5	491	401	2760	0.5	631	490	2390	0.5	456	377	2650	0.5	582	461
2x-2y	25	2300	0.7	295	240	2540	0.7	378	294	2220	0.7	274	226	2420	0.7	349	277
	40	1550	0.9	98	80	1620	0.9	126	98	1470	0.9	91	75	1520	0.9	116	92
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		518	360	7.20	6.00	518	360	7.20	6.00	486	337	7.20	6.00	486	337	7.20	6.00
1.00 %	0	3050	0.0	976	760	3470	0.0	1220	919	2960	0.0	914	718	3340	0.0	1140	868
Ar(in²)	11	2900	0.2	879	684	3270	0.2	1100	827	2810	0.2	823	646	3150	0.2	1030	782
= 4.80	13	2840	0.3	769	599	3200	0.3	964	724	2750	0.3	720	565	3080	0.3	896	684
	17	2700	0.4	659	513	3020	0.4	826	620	2610	0.4	617	485	2900	0.4	768	586
8-# 7	21	2530	0.5	549	428	2810	0.5	689	517	2450	0.5	514	404	2690	0.5	640	488
4x-2y	25	2350	0.7	329	256	2580	0.7	413	310	2260	0.7	308	242	2460	0.7	384	293
	40	1560	0.9	109	85	1620	0.9	137	103	1480	0.9	102	80	1530	0.9	128	97
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		518	359	7.20	6.00	518	359	7.20	6.00	485	336	7.20	6.00	485	336	7.20	6.00
1.88 %	0	3180	0.0	1140	914	3600	0.0	1380	1070	3090	0.0	1070	873	3470	0.0	1300	1020
Ar(in²)	11	3020	0.2	1020	823	3390	0.2	1250	964	2930	0.2	966	786	3270	0.2	1170	919
= 9.00	13	2950	0.3	894	720	3310	0.3	1090	844	2860	0.3	845	687	3190	0.3	1020	804
	17	2800	0.4	767	617	3120	0.4	934	723	2710	0.4	724	589	3000	0.4	876	689
4-#14	21	2620	0.5	639	514	2890	0.5	778	603	2530	0.5	604	491	2770	0.5	730	574
2x-2y	25	2420	0.7	383	308	2640	0.7	467	361	2330	0.7	362	294	2530	0.7	438	344
	40	1580	0.9	127	102	1630	0.9	155	120	1500	0.9	120	98	1540	0.9	146	114
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		516	358	7.20	6.00	516	358	7.20	6.00	483	335	7.20	6.00	483	335	7.20	6.00
2.60 %	0	3290	0.0	1280	937	3710	0.0	1530	1100	3200	0.0	1220	895	3580	0.0	1450	1050
Ar(in²)	11	3110	0.2	1160	844	3490	0.2	1380	986	3020	0.2	1100	806	3360	0.2	1300	940
=12.48	13	3050	0.3	1010	738	3400	0.3	1210	862	2960	0.3	962	705	3280	0.3	1140	823
	17	2890	0.4	867	633	3200	0.4	1030	739	2790	0.4	825	604	3080	0.4	976	705
8-#11	21	2690	0.5	722	527	2960	0.5	862	616	2600	0.5	687	503	2840	0.5	813	588
4x-2y	25	2480	0.7	433	316	2700	0.7	517	369	2390	0.7	412	302	2580	0.7	488	352
	40	1590	0.9	144	105	1640	0.9	172	123	1510	0.9	137	100	1540	0.9	162	117
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		515	357	7.20	6.00	515	357	7.20	6.00	482	335	7.20	6.00	482	335	7.20	6.00
3.75 %	0	3460	0.0	1500	1040	3880	0.0	1750	1190	3380	0.0	1440	1000	3760	0.0	1660	1140
Ar(in²)	11	3270	0.2	1350	932	3640	0.2	1570	1070	3180	0.2	1300	901	3510	0.2	1500	1030
=18.00	13	3190	0.3	1180	816	3550	0.3	1380	937	3100	0.3	1130	788	3420	0.3	1310	897
	17	3020	0.4	1010	699	3330	0.4	1180	803	2920	0.4	971	675	3200	0.4	1120	769
8-#14	21	2800	0.5	844	582	3070	0.5	983	669	2710	0.5	809	563	2940	0.5	935	641
4x-2y	25	2570	0.7	506	349	2780	0.7	590	401	2470	0.7	485	337	2660	0.7	561	384
	40	1610	0.9	168	116	1650	0.9	196	133	1520	0.9	161	112	1550	0.9	187	128
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		513	356	7.20	6.00	513	356	7.20	6.00	480	333	7.20	6.00	480	333	7.20	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²),　Cey = Pey(KyLy)²/10000. (kip-ft²),　KL in ft,　rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 24

Designation		W 14 x 99								W 14 x 90							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	2810	0.0	756	632	3150	0.0	959	773	2740	0.0	706	594	3050	0.0	890	728
Ar(in²)	11	2660	0.2	681	568	2970	0.2	863	696	2590	0.2	635	535	2870	0.2	801	655
= 2.40	13	2610	0.3	595	497	2900	0.3	755	609	2540	0.3	556	468	2800	0.3	701	573
	17	2470	0.4	510	426	2740	0.4	647	522	2400	0.4	476	401	2640	0.4	601	491
4-# 7	21	2320	0.5	425	355	2540	0.5	539	435	2240	0.5	397	334	2450	0.5	500	409
2x-2y	25	2140	0.7	255	213	2320	0.7	323	261	2070	0.7	238	200	2230	0.7	300	245
	40	1400	0.9	85	71	1440	0.9	107	87	1330	0.9	79	66	1370	0.9	100	81
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		457	317	7.20	6.00	457	317	7.20	6.00	431	299	7.20	6.00	431	299	7.20	6.00
1.00 %	0	2880	0.0	859	679	3230	0.0	1060	821	2810	0.0	809	642	3130	0.0	993	776
Ar(in²)	11	2730	0.2	773	611	3040	0.2	956	739	2660	0.2	728	578	2940	0.2	893	699
= 4.80	13	2670	0.3	676	535	2970	0.3	836	647	2600	0.3	637	505	2870	0.3	782	611
	17	2530	0.4	580	458	2790	0.4	717	554	2460	0.4	546	433	2700	0.4	670	524
8-# 7	21	2370	0.5	483	382	2590	0.5	597	462	2290	0.5	455	361	2490	0.5	558	436
4x-2y	25	2180	0.7	290	229	2360	0.7	358	277	2110	0.7	273	216	2270	0.7	335	262
	40	1410	0.9	96	76	1450	0.9	119	92	1340	0.9	91	72	1370	0.9	111	87
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		456	316	7.20	6.00	456	316	7.20	6.00	430	298	7.20	6.00	430	298	7.20	6.00
1.88 %	0	3010	0.0	1020	834	3360	0.0	1220	975	2950	0.0	968	797	3260	0.0	1150	930
Ar(in²)	11	2850	0.2	917	751	3150	0.2	1100	877	2780	0.2	871	718	3060	0.2	1040	837
= 9.00	13	2780	0.3	802	657	3080	0.3	962	767	2710	0.3	762	628	2980	0.3	907	732
	17	2630	0.4	687	563	2890	0.4	824	658	2560	0.4	653	538	2790	0.4	777	628
4-#14	21	2450	0.5	573	469	2670	0.5	687	548	2380	0.5	544	448	2570	0.5	648	523
2x-2y	25	2250	0.7	343	281	2420	0.7	412	329	2170	0.7	326	269	2330	0.7	388	314
	40	1420	0.9	114	93	1450	0.9	137	109	1350	0.9	108	89	1380	0.9	129	104
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		454	315	7.20	6.00	454	315	7.20	6.00	429	297	7.20	6.00	429	297	7.20	6.00
2.60 %	0	3120	0.0	1170	857	3470	0.0	1370	998	3060	0.0	1120	823	3370	0.0	1300	953
Ar(in²)	11	2950	0.2	1050	771	3250	0.2	1230	898	2870	0.2	1010	741	3150	0.2	1170	858
=12.48	13	2880	0.3	919	675	3170	0.3	1080	786	2810	0.3	880	648	3070	0.3	1020	751
	17	2710	0.4	788	578	2970	0.4	924	673	2640	0.4	754	556	2870	0.4	878	643
8-#11	21	2520	0.5	656	482	2730	0.5	770	561	2440	0.5	628	463	2630	0.5	731	536
4x-2y	25	2300	0.7	394	289	2470	0.7	462	336	2230	0.7	377	278	2380	0.7	439	321
	40	1430	0.9	131	96	1460	0.9	154	112	1360	0.9	125	92	1380	0.9	146	107
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		453	315	7.20	6.00	453	315	7.20	6.00	427	297	7.20	6.00	427	297	7.20	6.00
3.75 %	0	3300	0.0	1380	969	3650	0.0	1590	1090	3230	0.0	1330	941	3550	0.0	1520	1050
Ar(in²)	11	3100	0.2	1250	872	3400	0.2	1430	984	3030	0.2	1200	847	3300	0.2	1370	944
=18.00	13	3020	0.3	1090	763	3310	0.3	1250	861	2950	0.3	1050	741	3210	0.3	1190	826
	17	2840	0.4	934	654	3090	0.4	1070	738	2770	0.4	900	635	2990	0.4	1020	708
8-#14	21	2630	0.5	778	545	2830	0.5	892	615	2550	0.5	750	529	2730	0.5	853	590
4x-2y	25	2390	0.7	467	327	2550	0.7	535	369	2310	0.7	450	317	2450	0.7	512	354
	40	1440	0.9	155	109	1460	0.9	178	123	1370	0.9	150	105	1380	0.9	170	118
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		451	313	7.20	6.00	451	313	7.20	6.00	425	295	7.20	6.00	425	295	7.20	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 24

Designation		W 14 x 82							
Fy (ksi)		36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	2670	0.0	664	541	2960	0.0	833	643
Ar(in²)	11	2530	0.2	598	487	2780	0.2	750	579
= 2.40	13	2470	0.3	523	426	2710	0.3	656	506
	17	2340	0.4	448	365	2550	0.4	562	434
4-# 7	21	2180	0.5	373	304	2360	0.5	468	362
2x-2y	25	2000	0.7	224	182	2150	0.7	281	217
	40	1270	0.9	74	60	1300	0.9	93	72
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		407	282	7.20	6.00	407	282	7.20	6.00
1.00 %	0	2750	0.0	767	589	3040	0.0	936	691
Ar(in²)	11	2590	0.2	690	530	2850	0.2	842	622
= 4.80	13	2540	0.3	604	464	2780	0.3	737	544
	17	2390	0.4	518	397	2610	0.4	632	466
8-# 7	21	2230	0.5	431	331	2400	0.5	526	388
4x-2y	25	2040	0.7	259	198	2180	0.7	316	233
	40	1280	0.9	86	66	1300	0.9	105	77
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		406	282	7.20	6.00	406	282	7.20	6.00
1.98 %	0	2900	0.0	932	731	3180	0.0	1100	832
Ar(in²)	11	2720	0.2	838	658	2980	0.2	990	749
= 9.48	13	2660	0.3	734	575	2900	0.3	867	655
	17	2500	0.4	629	493	2710	0.4	743	561
12-# 8	21	2320	0.5	524	411	2490	0.5	619	468
4x-4y	25	2110	0.7	314	246	2250	0.7	371	280
	40	1290	0.9	104	82	1300	0.9	123	93
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		404	281	7.20	6.00	404	281	7.20	6.00
3.17 %	0	3080	0.0	1140	874	3370	0.0	1300	964
Ar(in²)	11	2880	0.2	1020	786	3130	0.2	1170	868
=15.24	13	2810	0.3	896	688	3050	0.3	1030	759
	17	2630	0.4	768	590	2840	0.4	880	651
12-#10	21	2420	0.5	640	491	2590	0.5	733	542
4x-4y	25	2190	0.7	384	295	2320	0.7	440	325
	40	1290	0.9	128	98	1300	0.9	146	108
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		402	279	7.20	6.00	402	279	7.20	6.00
3.90 %	0	3190	0.0	1260	967	3480	0.0	1420	1070
Ar(in²)	11	2980	0.2	1140	870	3230	0.2	1280	960
=18.72	13	2900	0.3	993	761	3130	0.3	1120	840
	17	2710	0.4	851	653	2910	0.4	960	720
12-#11	21	2490	0.5	709	544	2650	0.5	800	600
4x-4y	25	2240	0.7	425	326	2370	0.7	480	360
	40	1300	0.9	141	108	1300	0.9	160	120
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		401	278	7.20	6.00	401	278	7.20	6.00

Designation		W 14 x 74							
Fy (ksi)		36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	2610	0.0	621	512	2870	0.0	774	610
Ar(in²)	11	2460	0.2	559	461	2690	0.2	697	549
= 2.40	13	2410	0.3	489	403	2630	0.3	609	480
	17	2270	0.4	419	346	2460	0.4	522	412
4-# 7	21	2110	0.5	349	288	2270	0.5	435	343
2x-2y	25	1930	0.7	209	173	2060	0.7	261	206
	40	1210	0.9	69	57	1230	0.9	87	68
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		384	267	7.20	6.00	384	267	7.20	6.00
1.00 %	0	2690	0.0	724	560	2950	0.0	877	658
Ar(in²)	11	2530	0.2	651	504	2760	0.2	789	592
= 4.80	13	2470	0.3	570	441	2690	0.3	690	518
	17	2330	0.4	488	378	2520	0.4	592	444
8-# 7	21	2160	0.5	407	315	2320	0.5	493	370
4x-2y	25	1970	0.7	244	189	2100	0.7	296	222
	40	1210	0.9	81	63	1230	0.9	98	74
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		383	266	7.20	6.00	383	266	7.20	6.00
1.98 %	0	2840	0.0	889	702	3100	0.0	1040	799
Ar(in²)	11	2660	0.2	800	632	2890	0.2	937	719
= 9.48	13	2590	0.3	700	553	2810	0.3	820	629
	17	2440	0.4	600	474	2620	0.4	703	539
12-# 8	21	2250	0.5	500	395	2400	0.5	586	449
4x-4y	25	2040	0.7	300	237	2160	0.7	351	269
	40	1220	0.9	100	79	1230	0.9	117	89
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		382	265	7.20	6.00	382	265	7.20	6.00
3.17 %	0	3020	0.0	1100	853	3280	0.0	1250	932
Ar(in²)	11	2820	0.2	987	768	3040	0.2	1120	839
=15.24	13	2740	0.3	863	672	2960	0.3	980	734
	17	2570	0.4	740	576	2750	0.4	840	629
12-#10	21	2350	0.5	617	480	2500	0.5	700	524
4x-4y	25	2120	0.7	370	288	2240	0.7	420	314
	40	1230	0.9	123	96	1230	0.9	140	104
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		380	263	7.20	6.00	380	263	7.20	6.00
3.90 %	0	3130	0.0	1220	939	3390	0.0	1370	1030
Ar(in²)	11	2910	0.2	1100	845	3140	0.2	1230	931
=18.72	13	2830	0.3	961	739	3040	0.3	1080	814
	17	2640	0.4	824	634	2820	0.4	922	698
12-#11	21	2420	0.5	686	528	2560	0.5	768	581
4x-4y	25	2170	0.7	412	317	2280	0.7	461	349
	40	1230	0.9	137	105	1230	0.9	153	116
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		378	263	7.20	6.00	378	263	7.20	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) — Column Size(b x h): 20 x 24

Designation		W 14 x 68								W							
Fy (ksi)		36				50											
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy								
.50 %	0	2560	0.0	587	488	2800	0.0	727	583								
Ar(in²)	11	2420	0.2	528	439	2620	0.2	654	525								
= 2.40	13	2360	0.3	462	384	2560	0.3	573	459								
	17	2220	0.4	396	329	2400	0.4	491	393								
4-# 7	21	2060	0.5	330	274	2210	0.5	409	328								
2x-2y	25	1880	0.7	198	164	2000	0.7	245	196								
	40	1160	0.9	66	54	1180	0.9	81	65								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		366	254	7.20	6.00	366	254	7.20	6.00								
1.00 %	0	2640	0.0	690	536	2880	0.0	830	631								
Ar(in²)	11	2480	0.2	621	482	2690	0.2	747	568								
= 4.80	13	2420	0.3	543	422	2620	0.3	654	497								
	17	2280	0.4	466	362	2450	0.4	560	426								
8-# 7	21	2110	0.5	388	301	2250	0.5	467	355								
4x-2y	25	1920	0.7	233	181	2030	0.7	280	213								
	40	1160	0.9	77	60	1180	0.9	93	71								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		365	254	7.20	6.00	365	254	7.20	6.00								
1.98 %	0	2790	0.0	855	678	3030	0.0	995	772								
Ar(in²)	11	2610	0.2	769	610	2820	0.2	895	695								
= 9.48	13	2540	0.3	673	534	2740	0.3	783	608								
	17	2380	0.4	577	457	2550	0.4	671	521								
12-# 8	21	2190	0.5	481	381	2330	0.5	559	434								
4x-4y	25	1990	0.7	288	228	2090	0.7	335	260								
	40	1170	0.9	96	76	1180	0.9	111	86								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		364	252	7.20	6.00	364	252	7.20	6.00								
3.17 %	0	2970	0.0	1060	837	3210	0.0	1200	906								
Ar(in²)	11	2770	0.2	957	753	2970	0.2	1080	815								
=15.24	13	2690	0.3	837	659	2890	0.3	944	713								
	17	2510	0.4	717	565	2680	0.4	809	611								
12-#10	21	2300	0.5	598	470	2430	0.5	674	509								
4x-4y	25	2070	0.7	358	282	2170	0.7	404	305								
	40	1170	0.9	119	94	1170	0.9	134	101								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		362	251	7.20	6.00	362	251	7.20	6.00								
3.90 %	0	3080	0.0	1190	919	3320	0.0	1320	1010								
Ar(in²)	11	2860	0.2	1070	827	3070	0.2	1190	906								
=18.72	13	2780	0.3	935	723	2970	0.3	1040	793								
	17	2590	0.4	801	620	2750	0.4	891	680								
12-#11	21	2360	0.5	668	517	2490	0.5	742	566								
4x-4y	25	2110	0.7	400	310	2210	0.7	445	340								
	40	1170	0.9	133	103	1170	0.9	148	113								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		360	250	7.20	6.00	360	250	7.20	6.00								

Notes :
1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 8.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 20 x 24

Designation		W 12 x230								W 12 x210							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	3830	0.0	1430	1000	4640	0.0	1880	1210	3670	0.0	1320	949	4410	0.0	1730	1150
Ar(in²)	11	3680	0.2	1290	901	4420	0.2	1700	1090	3530	0.2	1190	854	4200	0.2	1560	1030
= 2.40	13	3630	0.3	1130	788	4340	0.3	1480	953	3470	0.3	1040	747	4120	0.3	1360	901
	17	3490	0.4	968	676	4140	0.4	1270	817	3340	0.4	892	640	3930	0.4	1170	772
4-# 7	21	3320	0.5	807	563	3900	0.5	1060	681	3170	0.5	743	533	3700	0.5	972	644
2x-2y	25	3130	0.7	484	338	3630	0.7	635	408	2980	0.7	446	320	3430	0.7	583	386
	40	2290	0.9	161	112	2480	0.9	211	136	2160	0.9	148	106	2330	0.9	194	128
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		841	584	7.20	6.00	841	584	7.20	6.00	782	543	7.20	6.00	782	543	7.20	6.00
1.00 %	0	3910	0.0	1540	1050	4710	0.0	1990	1260	3750	0.0	1420	995	4480	0.0	1830	1190
Ar(in²)	11	3750	0.2	1380	943	4490	0.2	1790	1130	3600	0.2	1280	895	4270	0.2	1650	1070
= 4.80	13	3690	0.3	1210	825	4410	0.3	1560	989	3540	0.3	1120	783	4190	0.3	1440	938
	17	3550	0.4	1040	707	4200	0.4	1340	848	3400	0.4	961	671	3990	0.4	1240	804
8-# 7	21	3380	0.5	864	589	3950	0.5	1120	706	3230	0.5	800	559	3750	0.5	1030	670
4x-2y	25	3180	0.7	518	353	3680	0.7	670	424	3030	0.7	480	335	3480	0.7	618	402
	40	2310	0.9	172	117	2490	0.9	223	141	2180	0.9	160	111	2340	0.9	206	134
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		840	583	7.20	6.00	840	583	7.20	6.00	781	542	7.20	6.00	781	542	7.20	6.00
2.12 %	0	4080	0.0	1760	1160	4880	0.0	2200	1360	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	3910	0.2	1580	1040	4640	0.2	1980	1230	0	0.2	0	0	0	0.2	0	0
=10.16	13	3840	0.3	1380	910	4550	0.3	1740	1070	0	0.3	0	0	0	0.3	0	0
	17	3690	0.4	1190	780	4330	0.4	1490	921	0	0.4	0	0	0	0.4	0	0
8-#10	21	3500	0.5	988	650	4070	0.5	1240	767	0	0.5	0	0	0	0.5	0	0
4x-2y	25	3290	0.7	592	390	3770	0.7	744	460	0	0.7	0	0	0	0.7	0	0
	40	2350	0.9	197	130	2520	0.9	248	153	0	0.9	0	0	0	0.9	0	0
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		838	582	7.20	6.00	838	582	7.20	6.00	0	0	.00	.00	0	0	.00	.00
2.60 %	0	4150	0.0	1840	1220	4950	0.0	2290	1430	3990	0.0	1730	1170	4730	0.0	2140	1370
Ar(in²)	11	3980	0.2	1660	1100	4710	0.2	2060	1290	3820	0.2	1560	1050	4490	0.2	1920	1230
=12.48	13	3910	0.3	1450	964	4620	0.3	1800	1130	3750	0.3	1360	922	4400	0.3	1680	1080
	17	3750	0.4	1240	826	4390	0.4	1550	967	3590	0.4	1170	791	4170	0.4	1440	922
8-#11	21	3550	0.5	1040	688	4120	0.5	1290	805	3400	0.5	973	659	3910	0.5	1200	769
4x-2y	25	3330	0.7	622	413	3810	0.7	773	483	3180	0.7	583	395	3610	0.7	721	461
	40	2370	0.9	207	137	2530	0.9	257	161	2230	0.9	194	131	2380	0.9	240	153
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		837	581	7.20	6.00	837	581	7.20	6.00	779	541	7.20	6.00	779	541	7.20	6.00
3.90 %	0	4350	0.0	2010	1420	5150	0.0	2450	1630	4190	0.0	1890	1370	4920	0.0	2300	1560
Ar(in²)	11	4160	0.2	1800	1280	4890	0.2	2210	1460	4000	0.2	1700	1230	4660	0.2	2070	1410
=18.72	13	4080	0.3	1580	1120	4780	0.3	1930	1280	3930	0.3	1490	1080	4560	0.3	1810	1230
	17	3910	0.4	1350	958	4540	0.4	1660	1100	3750	0.4	1280	923	4320	0.4	1550	1050
12-#11	21	3690	0.5	1130	799	4250	0.5	1380	915	3540	0.5	1060	769	4040	0.5	1290	879
4x-4y	25	3450	0.7	676	479	3920	0.7	827	549	3300	0.7	638	461	3720	0.7	776	527
	40	2410	0.9	225	159	2560	0.9	275	183	2270	0.9	212	153	2400	0.9	258	175
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		835	580	7.20	6.00	835	580	7.20	6.00	776	539	7.20	6.00	776	539	7.20	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 24

Designation		W 12 x190								W 12 x170							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	3510	0.0	1210	894	4180	0.0	1570	1080	3360	0.0	1100	838	3960	0.0	1420	1010
Ar(in²)	11	3370	0.2	1090	805	3980	0.2	1420	969	3220	0.2	993	754	3760	0.2	1280	907
= 2.40	13	3320	0.3	953	704	3900	0.3	1240	848	3160	0.3	869	660	3680	0.3	1120	794
	17	3180	0.4	817	603	3710	0.4	1060	727	3030	0.4	745	566	3500	0.4	961	680
4-# 7	21	3020	0.5	681	503	3490	0.5	884	605	2870	0.5	620	471	3280	0.5	801	567
2x-2y	25	2830	0.7	408	301	3230	0.7	530	363	2690	0.7	372	283	3040	0.7	480	340
	40	2020	0.9	136	100	2170	0.9	176	121	1890	0.9	124	94	2010	0.9	160	113
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		722	502	7.20	6.00	722	502	7.20	6.00	665	461	7.20	6.00	665	461	7.20	6.00
1.00 %	0	3590	0.0	1310	942	4250	0.0	1680	1120	3440	0.0	1210	886	4030	0.0	1530	1060
Ar(in²)	11	3440	0.2	1180	848	4040	0.2	1510	1010	3290	0.2	1090	797	3830	0.2	1370	949
= 4.80	13	3380	0.3	1030	742	3960	0.3	1320	884	3230	0.3	949	698	3750	0.3	1200	830
	17	3240	0.4	886	636	3770	0.4	1130	758	3090	0.4	814	598	3560	0.4	1030	712
8-# 7	21	3070	0.5	738	530	3540	0.5	942	632	2920	0.5	678	498	3330	0.5	858	593
4x-2y	25	2880	0.7	443	318	3280	0.7	565	379	2730	0.7	407	299	3080	0.7	515	356
	40	2040	0.9	147	106	2180	0.9	188	126	1910	0.9	135	99	2030	0.9	171	118
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		722	501	7.20	6.00	722	501	7.20	6.00	664	461	7.20	6.00	664	461	7.20	6.00
1.88 %	0	3720	0.0	1470	1090	4390	0.0	1840	1280	3570	0.0	1360	1040	4160	0.0	1680	1210
Ar(in²)	11	3560	0.2	1330	984	4160	0.2	1650	1150	3410	0.2	1230	934	3950	0.2	1520	1090
= 9.00	13	3500	0.3	1160	861	4080	0.3	1450	1000	3350	0.3	1070	817	3860	0.3	1330	950
	17	3350	0.4	993	738	3870	0.4	1240	860	3200	0.4	921	701	3660	0.4	1140	814
4-#14	21	3170	0.5	828	615	3630	0.5	1030	717	3020	0.5	767	584	3420	0.5	947	678
2x-2y	25	2960	0.7	496	369	3350	0.7	619	430	2810	0.7	460	350	3150	0.7	568	407
	40	2070	0.9	165	123	2200	0.9	206	143	1940	0.9	153	116	2040	0.9	189	135
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		720	500	7.20	6.00	720	500	7.20	6.00	662	460	7.20	6.00	662	460	7.20	6.00
2.60 %	0	3830	0.0	1620	1120	4500	0.0	1980	1300	3680	0.0	1510	1060	4270	0.0	1830	1230
Ar(in²)	11	3660	0.2	1460	1010	4260	0.2	1790	1170	3510	0.2	1360	956	4040	0.2	1650	1110
=12.48	13	3600	0.3	1280	880	4170	0.3	1560	1020	3440	0.3	1190	836	3960	0.3	1440	969
	17	3440	0.4	1090	754	3960	0.4	1340	877	3280	0.4	1020	717	3740	0.4	1240	831
8-#11	21	3240	0.5	911	628	3700	0.5	1120	731	3090	0.5	850	597	3490	0.5	1030	692
4x-2y	25	3030	0.7	546	377	3410	0.7	669	438	2880	0.7	510	358	3210	0.7	618	415
	40	2090	0.9	182	125	2210	0.9	223	146	1960	0.9	170	119	2050	0.9	206	138
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		719	499	7.20	6.00	719	499	7.20	6.00	661	459	7.20	6.00	661	459	7.20	6.00
3.90 %	0	4030	0.0	1780	1310	4690	0.0	2150	1500	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	3840	0.2	1600	1180	4440	0.2	1930	1350	0	0.2	0	0	0	0.2	0	0
=18.72	13	3770	0.3	1400	1040	4340	0.3	1690	1180	0	0.3	0	0	0	0.3	0	0
	17	3590	0.4	1200	887	4100	0.4	1450	1010	0	0.4	0	0	0	0.4	0	0
12-#11	21	3380	0.5	1000	739	3830	0.5	1210	841	0	0.5	0	0	0	0.5	0	0
4x-4y	25	3140	0.7	601	443	3510	0.7	724	504	0	0.7	0	0	0	0.7	0	0
	40	2130	0.9	200	147	2230	0.9	241	168	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		717	498	7.20	6.00	717	498	7.20	6.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 8.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 24

Designation		W 12 x152								W 12 x136							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	3220	0.0	1010	786	3750	0.0	1290	945	3090	0.0	923	736	3570	0.0	1170	884
Ar(in²)	11	3080	0.2	907	708	3560	0.2	1160	850	2950	0.2	830	663	3380	0.2	1060	796
= 2.40	13	3020	0.3	794	619	3490	0.3	1020	744	2900	0.3	726	580	3310	0.3	925	696
	17	2890	0.4	680	531	3310	0.4	872	637	2760	0.4	623	497	3130	0.4	792	597
4-# 7	21	2730	0.5	567	442	3100	0.5	727	531	2610	0.5	519	414	2930	0.5	660	497
2x-2y	25	2550	0.7	340	265	2860	0.7	436	318	2430	0.7	311	248	2700	0.7	396	298
	40	1770	0.9	113	88	1870	0.9	145	106	1660	0.9	103	82	1740	0.9	132	99
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		612	425	7.20	6.00	612	425	7.20	6.00	564	392	7.20	6.00	564	392	7.20	6.00
1.00 %	0	3300	0.0	1110	834	3830	0.0	1400	991	3170	0.0	1030	784	3640	0.0	1280	932
Ar(in²)	11	3150	0.2	999	751	3630	0.2	1260	892	3020	0.2	922	706	3450	0.2	1150	839
= 4.80	13	3090	0.3	874	657	3550	0.3	1100	781	2960	0.3	807	618	3370	0.3	1010	734
	17	2950	0.4	749	563	3370	0.4	941	669	2820	0.4	692	529	3190	0.4	861	629
8-# 7	21	2780	0.5	624	469	3150	0.5	784	557	2660	0.5	576	441	2980	0.5	718	524
4x-2y	25	2600	0.7	374	281	2900	0.7	470	334	2470	0.7	346	264	2740	0.7	430	314
	40	1790	0.9	124	93	1880	0.9	156	111	1670	0.9	115	88	1750	0.9	143	104
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		611	424	7.20	6.00	611	424	7.20	6.00	563	391	7.20	6.00	563	391	7.20	6.00
2.00 %	0	3450	0.0	1250	995	3980	0.0	1540	1150	3320	0.0	1170	945	3790	0.0	1420	1090
Ar(in²)	11	3280	0.2	1130	895	3760	0.2	1380	1040	3160	0.2	1050	851	3580	0.2	1280	983
= 9.60	13	3220	0.3	986	783	3680	0.3	1210	906	3090	0.3	919	744	3500	0.3	1120	860
	17	3070	0.4	845	671	3480	0.4	1040	776	2940	0.4	788	638	3300	0.4	957	737
16-# 7	21	2890	0.5	704	559	3240	0.5	865	647	2760	0.5	656	531	3070	0.5	797	614
4x-6y	25	2680	0.7	422	335	2980	0.7	519	388	2560	0.7	394	319	2810	0.7	478	368
	40	1820	0.9	140	111	1900	0.9	173	129	1700	0.9	131	106	1760	0.9	159	122
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		609	423	7.20	6.00	609	423	7.20	6.00	562	390	7.20	6.00	562	390	7.20	6.00
2.60 %	0	3540	0.0	1420	1010	4070	0.0	1700	1170	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	3370	0.2	1280	909	3840	0.2	1530	1050	0	0.2	0	0	0	0.2	0	0
=12.48	13	3300	0.3	1120	795	3760	0.3	1340	919	0	0.3	0	0	0	0.3	0	0
	17	3140	0.4	956	682	3550	0.4	1150	788	0	0.4	0	0	0	0.4	0	0
8-#11	21	2950	0.5	797	568	3300	0.5	957	656	0	0.5	0	0	0	0.5	0	0
4x-2y	25	2740	0.7	478	341	3030	0.7	574	394	0	0.7	0	0	0	0.7	0	0
	40	1830	0.9	159	113	1910	0.9	191	131	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		608	422	7.20	6.00	608	422	7.20	6.00	0	0	.00	.00	0	0	.00	.00
3.75 %	0	3710	0.0	1630	1110	4240	0.0	1920	1260	3590	0.0	1550	1060	4060	0.0	1800	1200
Ar(in²)	11	3520	0.2	1470	994	4000	0.2	1720	1140	3390	0.2	1390	950	3820	0.2	1620	1080
=18.00	13	3450	0.3	1290	870	3900	0.3	1510	993	3320	0.3	1220	831	3720	0.3	1420	946
	17	3280	0.4	1100	745	3680	0.4	1290	851	3140	0.4	1040	712	3500	0.4	1210	811
8-#14	21	3070	0.5	918	621	3410	0.5	1080	709	2930	0.5	870	593	3240	0.5	1010	676
4x-2y	25	2830	0.7	551	372	3110	0.7	646	425	2700	0.7	522	356	2940	0.7	606	405
	40	1860	0.9	183	124	1920	0.9	215	141	1730	0.9	174	118	1780	0.9	202	135
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		607	421	7.20	6.00	607	421	7.20	6.00	559	388	7.20	6.00	559	388	7.20	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 24

Designation		W 12 x120								W 12 x106							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	2970	0.0	841	686	3390	0.0	1060	824	2860	0.0	771	638	3230	0.0	965	768
Ar(in²)	11	2830	0.2	757	617	3210	0.2	956	742	2720	0.2	693	574	3050	0.2	868	691
= 2.40	13	2770	0.3	662	540	3140	0.3	836	649	2660	0.3	607	502	2980	0.3	760	604
	17	2640	0.4	568	463	2970	0.4	717	556	2530	0.4	520	430	2810	0.4	651	518
4-# 7	21	2480	0.5	473	385	2760	0.5	597	463	2370	0.5	433	358	2620	0.5	543	432
2x-2y	25	2300	0.7	284	231	2540	0.7	358	278	2190	0.7	260	215	2400	0.7	325	259
	40	1550	0.9	94	77	1620	0.9	119	92	1450	0.9	86	71	1500	0.9	108	86
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		518	360	7.20	6.00	518	360	7.20	6.00	478	332	7.20	6.00	478	332	7.20	6.00
1.00 %	0	3050	0.0	944	734	3470	0.0	1160	872	2940	0.0	873	686	3310	0.0	1070	816
Ar(in²)	11	2900	0.2	849	660	3270	0.2	1050	785	2790	0.2	786	617	3120	0.2	960	734
= 4.80	13	2840	0.3	743	578	3200	0.3	917	687	2730	0.3	687	540	3050	0.3	840	642
	17	2700	0.4	637	495	3020	0.4	786	588	2590	0.4	589	463	2870	0.4	720	550
8-# 7	21	2530	0.5	531	412	2810	0.5	655	490	2420	0.5	491	385	2660	0.5	600	459
4x-2y	25	2350	0.7	318	247	2580	0.7	393	294	2240	0.7	294	231	2430	0.7	360	275
	40	1560	0.9	106	82	1620	0.9	131	98	1460	0.9	98	77	1510	0.9	120	91
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		518	359	7.20	6.00	518	359	7.20	6.00	477	331	7.20	6.00	477	331	7.20	6.00
1.98 %	0	3190	0.0	1110	874	3610	0.0	1330	1010	3090	0.0	1040	827	3460	0.0	1230	955
Ar(in²)	11	3030	0.2	997	787	3400	0.2	1200	910	2920	0.2	934	744	3250	0.2	1110	860
= 9.48	13	2970	0.3	873	688	3320	0.3	1050	796	2850	0.3	817	651	3170	0.3	970	752
	17	2810	0.4	748	590	3130	0.4	897	683	2700	0.4	700	558	2980	0.4	831	645
12-# 8	21	2630	0.5	623	491	2900	0.5	747	569	2520	0.5	583	465	2750	0.5	693	537
4x-4y	25	2430	0.7	374	295	2650	0.7	448	341	2310	0.7	350	279	2500	0.7	415	322
	40	1580	0.9	124	98	1630	0.9	149	113	1480	0.9	116	93	1520	0.9	138	107
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		516	358	7.20	6.00	516	358	7.20	6.00	475	330	7.20	6.00	475	330	7.20	6.00
3.33 %	0	3400	0.0	1370	1090	3820	0.0	1590	1220	3290	0.0	1300	1040	3660	0.0	1490	1170
Ar(in²)	11	3210	0.2	1230	978	3580	0.2	1430	1100	3100	0.2	1170	936	3430	0.2	1340	1050
=16.00	13	3140	0.3	1080	856	3500	0.3	1250	962	3030	0.3	1020	819	3340	0.3	1170	919
	17	2970	0.4	922	733	3280	0.4	1070	824	2850	0.4	874	702	3130	0.4	1010	787
4-#18	21	2770	0.5	768	611	3030	0.5	892	687	2650	0.5	728	585	2880	0.5	837	656
2x-2y	25	2540	0.7	461	366	2750	0.7	535	412	2420	0.7	437	351	2600	0.7	502	393
	40	1610	0.9	153	122	1640	0.9	178	137	1500	0.9	145	117	1520	0.9	167	131
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		514	357	7.20	6.00	514	357	7.20	6.00	473	328	7.20	6.00	473	328	7.20	6.00
3.75 %	0	3460	0.0	1470	1010	3880	0.0	1690	1140	3350	0.0	1400	963	3730	0.0	1590	1090
Ar(in²)	11	3270	0.2	1320	905	3640	0.2	1520	1030	3160	0.2	1260	866	3480	0.2	1430	977
=18.00	13	3190	0.3	1150	791	3550	0.3	1330	899	3080	0.3	1100	758	3390	0.3	1250	855
	17	3020	0.4	989	678	3330	0.4	1140	771	2900	0.4	942	650	3170	0.4	1070	733
8-#14	21	2800	0.5	824	565	3070	0.5	948	642	2690	0.5	785	541	2910	0.5	893	611
4x-2y	25	2570	0.7	494	339	2780	0.7	569	385	2450	0.7	471	325	2630	0.7	536	366
	40	1610	0.9	164	113	1650	0.9	189	128	1500	0.9	157	108	1520	0.9	178	122
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		513	356	7.20	6.00	513	356	7.20	6.00	472	328	7.20	6.00	472	328	7.20	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) — Column Size(b x h): 20 x 24

Designation		W 12 x 96								W 12 x 87							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.50 %	0	2780	0.0	720	602	3120	0.0	896	725	2710	0.0	676	568	3020	0.0	834	685
Ar(in²)	11	2640	0.2	648	541	2940	0.2	806	652	2570	0.2	608	511	2840	0.2	751	616
= 2.40	13	2580	0.3	567	474	2870	0.3	705	571	2510	0.3	532	447	2770	0.3	657	539
	17	2450	0.4	486	406	2700	0.4	604	489	2380	0.4	456	383	2610	0.4	563	462
4-# 7	21	2290	0.5	405	338	2510	0.5	504	407	2220	0.5	380	319	2410	0.5	469	385
2x-2y	25	2110	0.7	243	203	2290	0.7	302	244	2040	0.7	228	191	2200	0.7	281	231
	40	1380	0.9	81	67	1420	0.9	100	81	1310	0.9	76	63	1340	0.9	93	77
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		448	311	7.20	6.00	448	311	7.20	6.00	422	293	7.20	6.00	422	293	7.20	6.00
1.00 %	0	2860	0.0	823	649	3190	0.0	998	773	2790	0.0	778	616	3090	0.0	936	733
Ar(in²)	11	2710	0.2	740	584	3000	0.2	898	695	2640	0.2	700	554	2900	0.2	843	660
= 4.80	13	2650	0.3	648	511	2930	0.3	786	608	2580	0.3	613	485	2830	0.3	737	577
	17	2510	0.4	555	438	2760	0.4	673	521	2440	0.4	525	415	2660	0.4	632	495
8-# 7	21	2340	0.5	463	365	2550	0.5	561	434	2270	0.5	437	346	2460	0.5	526	412
4x-2y	25	2150	0.7	277	219	2330	0.7	336	260	2080	0.7	262	207	2230	0.7	316	247
	40	1380	0.9	92	73	1420	0.9	112	86	1320	0.9	87	69	1350	0.9	105	82
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		447	310	7.20	6.00	447	310	7.20	6.00	421	292	7.20	6.00	421	292	7.20	6.00
1.98 %	0	3010	0.0	987	791	3340	0.0	1160	913	2940	0.0	943	757	3240	0.0	1100	874
Ar(in²)	11	2840	0.2	888	712	3130	0.2	1050	822	2770	0.2	848	682	3030	0.2	991	786
= 9.48	13	2770	0.3	777	623	3050	0.3	915	719	2700	0.3	742	596	2960	0.3	867	688
	17	2620	0.4	666	534	2870	0.4	784	616	2540	0.4	636	511	2770	0.4	743	590
12-# 8	21	2430	0.5	555	445	2640	0.5	653	514	2360	0.5	530	426	2550	0.5	619	491
4x-4y	25	2230	0.7	333	267	2400	0.7	392	308	2150	0.7	318	255	2300	0.7	371	295
	40	1400	0.9	111	89	1430	0.9	130	102	1330	0.9	106	85	1350	0.9	123	98
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		445	309	7.20	6.00	445	309	7.20	6.00	419	291	7.20	6.00	419	291	7.20	6.00
3.33 %	0	3210	0.0	1250	1010	3550	0.0	1420	1130	3140	0.0	1200	972	3450	0.0	1360	1090
Ar(in²)	11	3020	0.2	1120	905	3310	0.2	1280	1010	2950	0.2	1080	875	3210	0.2	1220	978
=16.00	13	2950	0.3	980	792	3220	0.3	1120	886	2870	0.3	945	766	3120	0.3	1070	855
	17	2770	0.4	840	678	3010	0.4	958	759	2690	0.4	810	656	2910	0.4	916	733
4-#18	21	2560	0.5	700	565	2760	0.5	798	633	2480	0.5	675	547	2660	0.5	764	611
2x-2y	25	2330	0.7	420	339	2490	0.7	479	379	2250	0.7	405	328	2390	0.7	458	366
	40	1410	0.9	140	113	1430	0.9	159	126	1340	0.9	135	109	1350	0.9	152	122
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		443	307	7.20	6.00	443	307	7.20	6.00	417	290	7.20	6.00	417	290	7.20	6.00
3.75 %	0	3280	0.0	1350	934	3610	0.0	1520	1040	3210	0.0	1300	908	3510	0.0	1460	1010
Ar(in²)	11	3070	0.2	1210	841	3370	0.2	1370	940	3000	0.2	1170	817	3270	0.2	1310	904
=18.00	13	3000	0.3	1060	735	3270	0.3	1200	822	2920	0.3	1020	715	3170	0.3	1150	791
	17	2810	0.4	908	630	3060	0.4	1030	705	2740	0.4	878	613	2950	0.4	984	678
8-#14	21	2600	0.5	756	525	2800	0.5	854	587	2520	0.5	731	511	2700	0.5	820	565
4x-2y	25	2360	0.7	454	315	2520	0.7	512	352	2280	0.7	439	306	2420	0.7	492	339
	40	1420	0.9	151	105	1430	0.9	170	117	1340	0.9	146	102	1350	0.9	164	113
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		442	307	7.20	6.00	442	307	7.20	6.00	416	289	7.20	6.00	416	289	7.20	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 24

Designation		W 12 x 79								W 12 x 72							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	2650	0.0	636	536	2930	0.0	779	648	2590	0.0	602	506	2840	0.0	732	613
Ar(in²)	11	2500	0.2	572	482	2750	0.2	701	583	2450	0.2	542	456	2670	0.2	659	552
= 2.40	13	2450	0.3	501	422	2680	0.3	614	510	2390	0.3	474	399	2600	0.3	577	483
	17	2310	0.4	429	361	2520	0.4	526	437	2250	0.4	406	342	2440	0.4	494	414
4-# 7	21	2150	0.5	358	301	2330	0.5	438	364	2090	0.5	338	285	2250	0.5	412	345
2x-2y	25	1970	0.7	214	180	2110	0.7	263	218	1910	0.7	203	171	2040	0.7	247	207
	40	1250	0.9	71	60	1270	0.9	87	72	1190	0.9	67	57	1210	0.9	82	69
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		398	276	7.20	6.00	398	276	7.20	6.00	377	262	7.20	6.00	377	262	7.20	6.00
1.00 %	0	2730	0.0	739	584	3000	0.0	882	696	2670	0.0	705	554	2920	0.0	835	661
Ar(in²)	11	2570	0.2	665	525	2810	0.2	793	626	2510	0.2	634	499	2730	0.2	751	595
= 4.80	13	2510	0.3	581	460	2740	0.3	694	548	2450	0.3	555	436	2660	0.3	657	521
	17	2370	0.4	498	394	2570	0.4	595	469	2310	0.4	475	374	2490	0.4	563	446
8-# 7	21	2200	0.5	415	328	2370	0.5	496	391	2140	0.5	396	312	2290	0.5	469	372
4x-2y	25	2010	0.7	249	197	2150	0.7	297	234	1950	0.7	237	187	2070	0.7	281	223
	40	1250	0.9	83	65	1270	0.9	99	78	1190	0.9	79	62	1210	0.9	93	74
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		397	276	7.20	6.00	397	276	7.20	6.00	376	261	7.20	6.00	376	261	7.20	6.00
1.98 %	0	2870	0.0	903	726	3150	0.0	1050	837	2820	0.0	869	700	3070	0.0	999	802
Ar(in²)	11	2700	0.2	813	653	2940	0.2	941	753	2640	0.2	782	630	2860	0.2	899	722
= 9.48	13	2630	0.3	711	571	2860	0.3	824	659	2580	0.3	684	551	2780	0.3	787	632
	17	2480	0.4	609	490	2680	0.4	706	565	2420	0.4	586	472	2600	0.4	674	542
12-# 8	21	2290	0.5	508	408	2460	0.5	588	470	2230	0.5	489	393	2380	0.5	562	451
4x-4y	25	2080	0.7	304	245	2210	0.7	353	282	2020	0.7	293	236	2140	0.7	337	271
	40	1260	0.9	101	81	1280	0.9	117	94	1200	0.9	97	78	1210	0.9	112	90
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		396	275	7.20	6.00	396	275	7.20	6.00	375	260	7.20	6.00	375	260	7.20	6.00
3.33 %	0	3080	0.0	1160	942	3360	0.0	1300	1050	3020	0.0	1130	913	3270	0.0	1260	1020
Ar(in²)	11	2880	0.2	1050	847	3120	0.2	1170	945	2820	0.2	1010	822	3040	0.2	1130	915
=16.00	13	2800	0.3	914	741	3030	0.3	1030	827	2740	0.3	887	719	2950	0.3	989	801
	17	2620	0.4	784	635	2820	0.4	880	709	2560	0.4	760	616	2740	0.4	848	686
4-#18	21	2410	0.5	653	529	2570	0.5	733	590	2350	0.5	634	513	2490	0.5	707	572
2x-2y	25	2180	0.7	392	317	2300	0.7	440	354	2110	0.7	380	308	2220	0.7	424	343
	40	1270	0.9	130	105	1270	0.9	146	118	1200	0.9	126	102	1210	0.9	141	114
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		393	273	7.20	6.00	393	273	7.20	6.00	372	258	7.20	6.00	372	258	7.20	6.00
3.75 %	0	3140	0.0	1260	885	3420	0.0	1400	970	3090	0.0	1230	865	3340	0.0	1360	942
Ar(in²)	11	2930	0.2	1140	796	3170	0.2	1260	873	2880	0.2	1100	779	3090	0.2	1220	848
=18.00	13	2860	0.3	993	697	3080	0.3	1110	764	2800	0.3	966	681	3000	0.3	1070	742
	17	2670	0.4	851	597	2860	0.4	947	655	2600	0.4	828	584	2780	0.4	915	636
8-#14	21	2450	0.5	709	497	2600	0.5	789	545	2380	0.5	690	486	2520	0.5	763	530
4x-2y	25	2210	0.7	425	298	2330	0.7	473	327	2140	0.7	414	292	2240	0.7	457	318
	40	1270	0.9	141	99	1270	0.9	157	109	1200	0.9	138	97	1200	0.9	152	106
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		393	272	7.20	6.00	393	272	7.20	6.00	372	258	7.20	6.00	372	258	7.20	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 24

Designation		W 10 x112								W 10 x100							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	2910	0.0	776	643	3300	0.0	953	763	2810	0.0	723	605	3160	0.0	881	718
Ar(in²)	11	2760	0.2	699	579	3120	0.2	858	687	2670	0.2	651	545	2980	0.2	793	647
= 2.40	13	2710	0.3	611	507	3050	0.3	751	601	2620	0.3	570	476	2910	0.3	694	566
	17	2580	0.4	524	434	2880	0.4	643	515	2480	0.4	488	408	2750	0.4	594	485
4-# 7	21	2420	0.5	436	362	2680	0.5	536	429	2320	0.5	407	340	2550	0.5	495	404
2x-2y	25	2240	0.7	262	217	2460	0.7	321	257	2150	0.7	244	204	2330	0.7	297	242
	40	1490	0.9	87	72	1550	0.9	107	85	1410	0.9	81	68	1450	0.9	99	80
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		495	343	7.20	6.00	495	343	7.20	6.00	460	319	7.20	6.00	460	319	7.20	6.00
1.00 %	0	2980	0.0	878	691	3370	0.0	1060	811	2890	0.0	826	653	3240	0.0	983	766
Ar(in²)	11	2830	0.2	790	622	3180	0.2	950	730	2740	0.2	743	588	3050	0.2	884	690
= 4.80	13	2770	0.3	692	544	3110	0.3	831	638	2680	0.3	650	514	2980	0.3	774	603
	17	2640	0.4	593	467	2930	0.4	712	547	2540	0.4	557	441	2800	0.4	663	517
8-# 7	21	2470	0.5	494	389	2730	0.5	593	456	2370	0.5	464	367	2600	0.5	552	431
4x-2y	25	2280	0.7	296	233	2490	0.7	356	273	2190	0.7	278	220	2370	0.7	331	258
	40	1500	0.9	98	77	1560	0.9	118	91	1420	0.9	92	73	1460	0.9	110	86
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		494	343	7.20	6.00	494	343	7.20	6.00	459	319	7.20	6.00	459	319	7.20	6.00
1.98 %	0	3130	0.0	1040	832	3520	0.0	1220	951	3040	0.0	990	794	3390	0.0	1150	907
Ar(in²)	11	2960	0.2	938	749	3310	0.2	1100	856	2870	0.2	891	715	3180	0.2	1030	816
= 9.48	13	2900	0.3	821	655	3230	0.3	960	749	2810	0.3	779	625	3100	0.3	903	714
	17	2750	0.4	703	562	3040	0.4	823	642	2650	0.4	668	536	2910	0.4	774	612
12-# 8	21	2570	0.5	586	468	2820	0.5	686	535	2470	0.5	557	446	2690	0.5	645	510
4x-4y	25	2360	0.7	351	281	2570	0.7	411	321	2260	0.7	334	268	2440	0.7	387	306
	40	1520	0.9	117	93	1560	0.9	137	107	1430	0.9	111	89	1460	0.9	129	102
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		492	342	7.20	6.00	492	342	7.20	6.00	457	317	7.20	6.00	457	317	7.20	6.00
3.17 %	0	3310	0.0	1240	965	3700	0.0	1420	1080	3220	0.0	1190	927	3570	0.0	1350	1040
Ar(in²)	11	3130	0.2	1120	869	3470	0.2	1280	975	3030	0.2	1070	835	3340	0.2	1210	935
=15.24	13	3060	0.3	977	760	3380	0.3	1120	853	2960	0.3	936	730	3250	0.3	1060	818
	17	2880	0.4	838	651	3170	0.4	957	731	2790	0.4	802	626	3040	0.4	908	701
12-#10	21	2680	0.5	698	543	2930	0.5	798	609	2580	0.5	668	521	2790	0.5	757	584
4x-4y	25	2460	0.7	419	325	2650	0.7	478	365	2350	0.7	401	313	2520	0.7	454	350
	40	1540	0.9	139	108	1570	0.9	159	121	1440	0.9	133	104	1470	0.9	151	116
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		490	340	7.20	6.00	490	340	7.20	6.00	455	316	7.20	6.00	455	316	7.20	6.00
3.90 %	0	3420	0.0	1350	1070	3810	0.0	1520	1180	3330	0.0	1290	1030	3680	0.0	1450	1140
Ar(in²)	11	3220	0.2	1210	960	3570	0.2	1370	1070	3130	0.2	1160	926	3430	0.2	1300	1030
=18.72	13	3150	0.3	1060	840	3470	0.3	1200	932	3050	0.3	1020	811	3340	0.3	1140	898
	17	2970	0.4	908	720	3250	0.4	1030	799	2870	0.4	873	695	3120	0.4	978	770
12-#11	21	2750	0.5	757	600	2990	0.5	856	666	2650	0.5	727	579	2860	0.5	815	641
4x-4y	25	2510	0.7	454	360	2700	0.7	513	399	2410	0.7	436	347	2570	0.7	489	385
	40	1550	0.9	151	120	1580	0.9	171	133	1450	0.9	145	115	1470	0.9	163	128
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		489	339	7.20	6.00	489	339	7.20	6.00	454	315	7.20	6.00	454	315	7.20	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 24

Designation		W 10 x 88								W 10 x 77							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	2720	0.0	672	565	3030	0.0	811	672	2630	0.0	625	524	2900	0.0	746	625
Ar(in²)	11	2580	0.2	605	508	2850	0.2	729	605	2490	0.2	563	472	2720	0.2	671	563
= 2.40	13	2520	0.3	529	444	2780	0.3	638	529	2430	0.3	492	413	2660	0.3	587	492
	17	2390	0.4	454	381	2620	0.4	547	453	2300	0.4	422	354	2490	0.4	503	422
4-# 7	21	2230	0.5	378	317	2420	0.5	456	378	2140	0.5	351	295	2300	0.5	419	351
2x-2y	25	2050	0.7	227	190	2210	0.7	273	226	1960	0.7	211	177	2090	0.7	251	211
	40	1320	0.9	75	63	1350	0.9	91	75	1230	0.9	70	59	1250	0.9	83	70
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		425	295	7.20	6.00	425	295	7.20	6.00	392	272	7.20	6.00	392	272	7.20	6.00
1.00 %	0	2800	0.0	774	612	3110	0.0	912	720	2710	0.0	727	572	2980	0.0	848	673
Ar(in²)	11	2640	0.2	697	551	2920	0.2	821	648	2550	0.2	654	515	2790	0.2	763	606
= 4.80	13	2580	0.3	609	482	2840	0.3	718	567	2490	0.3	573	450	2720	0.3	667	530
	17	2440	0.4	522	413	2670	0.4	616	486	2350	0.4	491	386	2550	0.4	572	454
8-# 7	21	2280	0.5	435	344	2470	0.5	513	405	2180	0.5	409	322	2350	0.5	477	378
4x-2y	25	2090	0.7	261	206	2250	0.7	308	243	1990	0.7	245	193	2130	0.7	286	227
	40	1320	0.9	87	68	1350	0.9	102	81	1240	0.9	81	64	1260	0.9	95	75
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		424	294	7.20	6.00	424	294	7.20	6.00	391	272	7.20	6.00	391	272	7.20	6.00
1.98 %	0	2950	0.0	938	754	3250	0.0	1080	861	2860	0.0	892	714	3130	0.0	1010	814
Ar(in²)	11	2770	0.2	845	679	3050	0.2	969	774	2680	0.2	802	642	2920	0.2	911	733
= 9.48	13	2710	0.3	739	594	2970	0.3	847	678	2620	0.3	702	562	2840	0.3	797	641
	17	2550	0.4	633	509	2780	0.4	726	581	2460	0.4	602	482	2650	0.4	683	549
12-# 8	21	2370	0.5	528	424	2560	0.5	605	484	2270	0.5	501	401	2430	0.5	569	458
4x-4y	25	2160	0.7	316	254	2310	0.7	363	290	2070	0.7	301	241	2190	0.7	341	274
	40	1340	0.9	105	84	1360	0.9	121	96	1240	0.9	100	80	1260	0.9	113	91
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		422	293	7.20	6.00	422	293	7.20	6.00	390	270	7.20	6.00	390	270	7.20	6.00
3.17 %	0	3130	0.0	1140	894	3440	0.0	1280	993	3040	0.0	1090	864	3310	0.0	1210	947
Ar(in²)	11	2930	0.2	1020	805	3200	0.2	1150	894	2840	0.2	981	777	3080	0.2	1090	852
=15.24	13	2860	0.3	896	704	3120	0.3	1000	782	2770	0.3	859	680	2990	0.3	954	746
	17	2690	0.4	768	604	2910	0.4	861	670	2590	0.4	736	583	2780	0.4	817	639
12-#10	21	2480	0.5	640	503	2660	0.5	717	558	2380	0.5	613	486	2530	0.5	681	532
4x-4y	25	2250	0.7	384	302	2390	0.7	430	335	2150	0.7	368	291	2270	0.7	408	319
	40	1350	0.9	128	100	1360	0.9	143	111	1250	0.9	122	97	1260	0.9	136	106
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		420	292	7.20	6.00	420	292	7.20	6.00	388	269	7.20	6.00	388	269	7.20	6.00
3.90 %	0	3240	0.0	1240	990	3550	0.0	1380	1100	3150	0.0	1200	950	3420	0.0	1320	1050
Ar(in²)	11	3030	0.2	1120	891	3300	0.2	1240	985	2940	0.2	1080	855	3170	0.2	1180	944
=18.72	13	2950	0.3	977	779	3200	0.3	1090	862	2860	0.3	941	748	3080	0.3	1040	826
	17	2760	0.4	838	668	2980	0.4	931	739	2670	0.4	806	641	2850	0.4	887	708
12-#11	21	2540	0.5	698	557	2720	0.5	776	616	2440	0.5	672	534	2590	0.5	739	590
4x-4y	25	2300	0.7	419	334	2440	0.7	465	369	2200	0.7	403	320	2310	0.7	443	354
	40	1350	0.9	139	111	1360	0.9	155	123	1250	0.9	134	106	1250	0.9	147	118
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		419	291	7.20	6.00	419	291	7.20	6.00	386	268	7.20	6.00	386	268	7.20	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 24

Designation		W 10 x 68								W							
Fy (ksi)		36				50											
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy								
.50 %	0	2560	0.0	587	489	2800	0.0	694	585								
Ar(in²)	11	2420	0.2	529	440	2620	0.2	625	526								
= 2.40	13	2360	0.3	462	385	2560	0.3	547	460								
	17	2220	0.4	396	330	2400	0.4	468	394								
4-# 7	21	2060	0.5	330	275	2210	0.5	390	329								
2x-2y	25	1880	0.7	198	165	2000	0.7	234	197								
	40	1160	0.9	66	55	1180	0.9	78	65								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		366	254	7.20	6.00	366	254	7.20	6.00								
1.00 %	0	2640	0.0	689	537	2880	0.0	796	633								
Ar(in²)	11	2480	0.2	620	483	2690	0.2	716	569								
= 4.80	13	2420	0.3	543	423	2620	0.3	627	498								
	17	2280	0.4	465	362	2450	0.4	537	427								
8-# 7	21	2110	0.5	388	302	2250	0.5	447	356								
4x-2y	25	1920	0.7	232	181	2030	0.7	268	213								
	40	1160	0.9	77	60	1180	0.9	89	71								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		365	254	7.20	6.00	365	254	7.20	6.00								
1.98 %	0	2790	0.0	854	679	3030	0.0	960	773								
Ar(in²)	11	2610	0.2	768	611	2820	0.2	864	696								
= 9.48	13	2540	0.3	672	534	2740	0.3	756	609								
	17	2380	0.4	576	458	2550	0.4	648	522								
12-# 8	21	2190	0.5	480	382	2330	0.5	540	435								
4x-4y	25	1990	0.7	288	229	2090	0.7	324	261								
	40	1170	0.9	96	76	1180	0.9	108	87								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		364	252	7.20	6.00	364	252	7.20	6.00								
3.17 %	0	2970	0.0	1050	839	3210	0.0	1160	909								
Ar(in²)	11	2770	0.2	948	755	2970	0.2	1040	818								
=15.24	13	2690	0.3	829	661	2890	0.3	913	716								
	17	2510	0.4	711	566	2680	0.4	782	614								
12-#10	21	2300	0.5	592	472	2430	0.5	652	511								
4x-4y	25	2070	0.7	355	283	2170	0.7	391	307								
	40	1170	0.9	118	94	1170	0.9	130	102								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		362	251	7.20	6.00	362	251	7.20	6.00								
3.90 %	0	3080	0.0	1160	920	3320	0.0	1260	1010								
Ar(in²)	11	2860	0.2	1040	828	3070	0.2	1140	908								
=18.72	13	2780	0.3	911	725	2970	0.3	994	795								
	17	2590	0.4	781	621	2750	0.4	852	681								
12-#11	21	2360	0.5	651	518	2490	0.5	710	567								
4x-4y	25	2110	0.7	390	310	2210	0.7	426	340								
	40	1170	0.9	130	103	1170	0.9	142	113								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		360	250	7.20	6.00	360	250	7.20	6.00								

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 20

Designation		W 14 x 82								W 14 x 74							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.60 %	0	2350	0.0	566	510	2630	0.0	732	601	2290	0.0	524	484	2550	0.0	673	572
Ar(in²)	11	2230	0.2	509	459	2480	0.2	659	540	2160	0.2	472	436	2390	0.2	606	514
= 2.40	13	2180	0.3	445	402	2420	0.3	576	473	2120	0.3	413	381	2340	0.3	530	450
	17	2070	0.4	382	344	2280	0.4	494	405	2000	0.4	354	327	2200	0.4	454	386
4-# 7	21	1930	0.5	318	287	2120	0.5	411	338	1870	0.5	295	272	2040	0.5	379	321
2x-2y	25	1780	0.7	191	172	1940	0.7	247	202	1720	0.7	177	163	1850	0.7	227	193
	40	1160	0.9	63	57	1200	0.9	82	67	1100	0.9	59	54	1130	0.9	75	64
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		267	263	6.05	6.00	267	263	6.05	6.00	250	247	6.04	6.00	250	247	6.04	6.00
.79 %	0	2370	0.0	592	535	2660	0.0	757	625	2310	0.0	549	509	2570	0.0	699	597
Ar(in²)	11	2250	0.2	532	481	2500	0.2	681	563	2190	0.2	494	458	2420	0.2	629	537
= 3.16	13	2200	0.3	466	421	2440	0.3	596	492	2140	0.3	433	401	2360	0.3	550	470
	17	2090	0.4	399	361	2300	0.4	511	422	2020	0.4	371	343	2220	0.4	471	402
4-# 8	21	1950	0.5	333	301	2130	0.5	426	352	1890	0.5	309	286	2050	0.5	393	335
2x-2y	25	1800	0.7	199	180	1950	0.7	255	211	1730	0.7	185	171	1870	0.7	235	201
	40	1170	0.9	66	60	1200	0.9	85	70	1110	0.9	61	57	1130	0.9	78	67
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		267	263	6.05	6.00	267	263	6.05	6.00	250	247	6.04	6.00	250	247	6.04	6.00
2.25 %	0	2560	0.0	773	712	2840	0.0	939	801	2490	0.0	731	687	2750	0.0	881	772
Ar(in²)	11	2410	0.2	696	641	2660	0.2	845	721	2350	0.2	658	618	2580	0.2	793	695
= 9.00	13	2360	0.3	609	561	2600	0.3	740	630	2290	0.3	575	541	2510	0.3	694	608
	17	2220	0.4	522	480	2440	0.4	634	540	2160	0.4	493	463	2350	0.4	594	521
4-#14	21	2070	0.5	435	400	2250	0.5	528	450	2000	0.5	411	386	2160	0.5	495	434
2x-2y	25	1890	0.7	261	240	2040	0.7	317	270	1830	0.7	246	231	1950	0.7	297	260
	40	1180	0.9	87	80	1210	0.9	105	90	1120	0.9	82	77	1140	0.9	99	86
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		266	261	6.05	6.00	266	261	6.05	6.00	249	245	6.04	6.00	249	245	6.04	6.00
3.12 %	0	2670	0.0	854	829	2950	0.0	1010	917	2600	0.0	817	803	2860	0.0	954	888
Ar(in²)	11	2510	0.2	768	746	2760	0.2	905	825	2440	0.2	736	723	2670	0.2	859	799
=12.48	13	2450	0.3	672	652	2690	0.3	791	722	2380	0.3	644	633	2600	0.3	751	699
	17	2310	0.4	576	559	2510	0.4	678	619	2240	0.4	552	542	2430	0.4	644	599
8-#11	21	2140	0.5	480	466	2310	0.5	565	515	2070	0.5	460	452	2220	0.5	536	499
2x-4y	25	1950	0.7	288	279	2080	0.7	339	309	1880	0.7	276	271	2000	0.7	322	299
	40	1190	0.9	96	93	1210	0.9	113	103	1130	0.9	92	90	1140	0.9	107	99
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		265	261	6.05	6.00	265	261	6.05	6.00	248	245	6.04	6.00	248	245	6.04	6.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 20

Designation		W 14 x 68								W 14 x 61							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.60 %	0	2240	0.0	490	463	2480	0.0	627	547	2180	0.0	452	437	2400	0.0	574	517
Ar(in²)	11	2110	0.2	441	416	2330	0.2	564	492	2060	0.2	407	393	2250	0.2	516	465
= 2.40	13	2070	0.3	386	364	2270	0.3	494	431	2010	0.3	356	344	2190	0.3	452	407
	17	1950	0.4	331	312	2130	0.4	423	369	1900	0.4	305	295	2050	0.4	387	349
4-# 7	21	1820	0.5	276	260	1970	0.5	352	308	1760	0.5	254	245	1890	0.5	323	291
2x-2y	25	1670	0.7	165	156	1790	0.7	211	184	1610	0.7	152	147	1720	0.7	193	174
	40	1060	0.9	55	52	1080	0.9	70	61	1000	0.9	50	49	1020	0.9	64	58
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		235	235	6.01	6.00	235	235	6.01	6.00	220	220	6.00	6.00	220	220	6.00	6.00
.79 %	0	2260	0.0	516	488	2500	0.0	653	572	2210	0.0	477	461	2420	0.0	600	542
Ar(in²)	11	2140	0.2	464	439	2350	0.2	588	515	2080	0.2	430	415	2270	0.2	540	488
= 3.16	13	2090	0.3	406	384	2290	0.3	514	450	2030	0.3	376	363	2210	0.3	472	427
	17	1970	0.4	348	329	2150	0.4	441	386	1910	0.4	322	311	2070	0.4	405	366
4-# 8	21	1840	0.5	290	274	1980	0.5	367	321	1780	0.5	268	259	1910	0.5	337	305
2x-2y	25	1680	0.7	174	164	1800	0.7	220	193	1620	0.7	161	155	1730	0.7	202	183
	40	1060	0.9	58	54	1080	0.9	73	64	1000	0.9	53	51	1020	0.9	67	61
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		235	234	6.01	6.00	235	234	6.01	6.00	220	220	6.00	6.00	220	220	6.00	6.00
2.25 %	0	2450	0.0	697	665	2680	0.0	834	748	2390	0.0	659	640	2600	0.0	781	719
Ar(in²)	11	2300	0.2	627	599	2510	0.2	751	673	2240	0.2	593	576	2430	0.2	703	647
= 9.00	13	2240	0.3	549	524	2440	0.3	657	589	2180	0.3	519	504	2360	0.3	615	566
	17	2110	0.4	470	449	2280	0.4	563	505	2050	0.4	444	432	2200	0.4	527	485
4-#14	21	1950	0.5	392	374	2090	0.5	469	421	1890	0.5	370	360	2010	0.5	439	404
2x-2y	25	1770	0.7	235	224	1880	0.7	281	252	1710	0.7	222	216	1810	0.7	263	242
	40	1070	0.9	78	74	1090	0.9	93	84	1010	0.9	74	72	1020	0.9	87	80
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		234	233	6.01	6.00	234	233	6.01	6.00	219	219	6.00	6.00	219	219	6.00	6.00
3.12 %	0	2560	0.0	788	782	2800	0.0	912	864	2500	0.0	753	757	2710	0.0	865	835
Ar(in²)	11	2390	0.2	709	704	2600	0.2	821	778	2340	0.2	678	681	2520	0.2	778	752
=12.48	13	2330	0.3	620	616	2530	0.3	718	681	2270	0.3	593	596	2450	0.3	681	658
	17	2190	0.4	531	528	2360	0.4	616	583	2120	0.4	508	511	2270	0.4	584	564
8-#11	21	2010	0.5	443	440	2150	0.5	513	486	1950	0.5	423	426	2070	0.5	486	470
2x-4y	25	1820	0.7	265	264	1930	0.7	308	291	1760	0.7	254	255	1850	0.7	292	282
	40	1080	0.9	88	88	1080	0.9	102	97	1010	0.9	84	85	1020	0.9	97	94
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		233	232	6.01	6.00	233	232	6.01	6.00	218	218	6.00	6.00	218	218	6.00	6.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85   f'c : 8.0 ksi NW
φb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 20 x 20

Designation		W 12 x 96								W 12 x 87							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.60 %	0	2460	0.0	608	569	2790	0.0	780	681	2390	0.0	564	539	2690	0.0	719	645
Ar(in^2)	11	2340	0.2	547	512	2640	0.2	702	613	2270	0.2	507	485	2540	0.2	647	581
= 2.40	13	2290	0.3	479	448	2580	0.3	614	536	2220	0.3	444	424	2480	0.3	566	508
	17	2180	0.4	410	384	2440	0.4	526	460	2110	0.4	380	364	2340	0.4	485	435
4-# 7	21	2050	0.5	342	320	2270	0.5	439	383	1980	0.5	317	303	2170	0.5	404	363
2x-2y	25	1900	0.7	205	192	2080	0.7	263	230	1830	0.7	190	182	1990	0.7	242	217
	40	1270	0.9	68	64	1310	0.9	87	76	1200	0.9	63	60	1240	0.9	80	72
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		291	291	6.00	6.00	291	291	6.00	6.00	273	273	6.00	6.00	273	273	6.00	6.00
1.20 %	0	2530	0.0	669	650	2870	0.0	841	761	2460	0.0	626	620	2770	0.0	780	725
Ar(in^2)	11	2400	0.2	602	585	2700	0.2	757	685	2330	0.2	563	558	2610	0.2	702	653
= 4.80	13	2350	0.3	527	512	2640	0.3	662	599	2280	0.3	492	488	2540	0.3	614	571
	17	2240	0.4	452	439	2490	0.4	568	514	2170	0.4	422	418	2400	0.4	527	489
8-# 7	21	2100	0.5	376	366	2320	0.5	473	428	2020	0.5	352	348	2220	0.5	439	408
2x-4y	25	1940	0.7	226	219	2120	0.7	284	257	1870	0.7	211	209	2030	0.7	263	244
	40	1280	0.9	75	73	1320	0.9	94	85	1210	0.9	70	69	1250	0.9	87	81
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		291	291	6.00	6.00	291	291	6.00	6.00	273	273	6.00	6.00	273	273	6.00	6.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in^2)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in^2)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in^2)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 20 x 20

Designation		W 12 x 79								W 12 x 72							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.60 %	0	2320	0.0	524	510	2600	0.0	665	611	2270	0.0	490	483	2520	0.0	618	580
Ar(in^2)	11	2200	0.2	472	459	2450	0.2	598	550	2140	0.2	441	435	2370	0.2	556	522
= 2.40	13	2150	0.3	413	401	2390	0.3	523	481	2100	0.3	386	381	2310	0.3	486	457
	17	2040	0.4	354	344	2250	0.4	448	412	1990	0.4	331	326	2170	0.4	417	391
4-# 7	21	1910	0.5	295	286	2090	0.5	374	344	1850	0.5	276	272	2010	0.5	347	326
2x-2y	25	1760	0.7	177	172	1900	0.7	224	206	1700	0.7	165	163	1830	0.7	208	195
	40	1140	0.9	59	57	1170	0.9	74	68	1090	0.9	55	54	1110	0.9	69	65
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		257	257	6.00	6.00	257	257	6.00	6.00	242	242	6.00	6.00	242	242	6.00	6.00
.79 %	0	2350	0.0	549	535	2620	0.0	690	636	2290	0.0	516	508	2540	0.0	643	605
Ar(in^2)	11	2220	0.2	494	481	2470	0.2	621	572	2170	0.2	464	457	2390	0.2	579	544
= 3.16	13	2180	0.3	433	421	2410	0.3	543	500	2120	0.3	406	400	2330	0.3	506	476
	17	2060	0.4	371	361	2270	0.4	465	429	2000	0.4	348	343	2190	0.4	434	408
4-# 8	21	1930	0.5	309	301	2100	0.5	388	357	1870	0.5	290	286	2020	0.5	361	340
2x-2y	25	1770	0.7	185	180	1920	0.7	232	214	1710	0.7	174	171	1840	0.7	217	204
	40	1140	0.9	61	60	1170	0.9	77	71	1090	0.9	58	57	1110	0.9	72	68
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		257	257	6.00	6.00	257	257	6.00	6.00	242	242	6.00	6.00	242	242	6.00	6.00
1.80 %	0	2470	0.0	668	639	2750	0.0	808	739	2420	0.0	634	612	2670	0.0	760	709
Ar(in^2)	11	2340	0.2	601	575	2580	0.2	727	665	2280	0.2	571	551	2500	0.2	684	638
= 7.20	13	2280	0.3	526	503	2520	0.3	636	582	2230	0.3	500	482	2440	0.3	599	558
	17	2160	0.4	451	431	2360	0.4	545	499	2100	0.4	428	413	2280	0.4	513	478
12-# 7	21	2010	0.5	376	359	2180	0.5	454	416	1950	0.5	357	344	2100	0.5	428	398
4x-4y	25	1840	0.7	225	215	1980	0.7	272	249	1780	0.7	214	206	1900	0.7	256	239
	40	1160	0.9	75	71	1180	0.9	90	83	1100	0.9	71	68	1120	0.9	85	79
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		256	256	6.00	6.00	256	256	6.00	6.00	241	241	6.00	6.00	241	241	6.00	6.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in^2)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in^2)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 8.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) — Column Size(b x h): 20 x 20

Designation		W 12 x 65								W 12 x 58							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.60 %	0	2210	0.0	457	456	2440	0.0	572	548	2160	0.0	425	425	2360	0.0	528	504
Ar(in²)	11	2090	0.2	411	410	2290	0.2	514	493	2030	0.2	383	382	2210	0.2	475	454
= 2.40	13	2040	0.3	360	359	2230	0.3	450	431	1990	0.3	335	334	2150	0.3	416	397
	17	1930	0.4	308	307	2100	0.4	386	370	1870	0.4	287	287	2020	0.4	356	340
4-# 7	21	1790	0.5	257	256	1940	0.5	321	308	1730	0.5	239	239	1860	0.5	297	283
2x-2y	25	1640	0.7	154	153	1760	0.7	193	185	1580	0.7	143	143	1680	0.7	178	170
	40	1030	0.9	51	51	1050	0.9	64	61	976	0.9	47	47	991	0.9	59	56
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		228	228	6.00	6.00	228	228	6.00	6.00	214	214	6.00	6.00	214	214	6.00	6.00
.79 %	0	2240	0.0	482	480	2470	0.0	597	572	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	2110	0.2	434	432	2310	0.2	537	515	0	0.2	0	0	0	0.2	0	0
= 3.16	13	2060	0.3	380	378	2250	0.3	470	451	0	0.3	0	0	0	0.3	0	0
	17	1950	0.4	325	324	2120	0.4	403	386	0	0.4	0	0	0	0.4	0	0
4-# 8	21	1810	0.5	271	270	1950	0.5	335	322	0	0.5	0	0	0	0.5	0	0
2x-2y	25	1660	0.7	162	162	1770	0.7	201	193	0	0.7	0	0	0	0.7	0	0
	40	1040	0.9	54	54	1050	0.9	67	64	0	0.9	0	0	0	0.9	0	0
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		228	228	6.00	6.00	228	228	6.00	6.00	0	0	.00	.00	0	0	.00	.00
1.80 %	0	2370	0.0	601	585	2590	0.0	714	676	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	2220	0.2	541	526	2420	0.2	643	609	0	0.2	0	0	0	0.2	0	0
= 7.20	13	2170	0.3	473	460	2360	0.3	562	533	0	0.3	0	0	0	0.3	0	0
	17	2040	0.4	406	395	2210	0.4	482	456	0	0.4	0	0	0	0.4	0	0
12-# 7	21	1890	0.5	338	329	2030	0.5	402	380	0	0.5	0	0	0	0.5	0	0
4x-4y	25	1720	0.7	203	197	1830	0.7	241	228	0	0.7	0	0	0	0.7	0	0
	40	1040	0.9	67	65	1060	0.9	80	76	0	0.9	0	0	0	0.9	0	0
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		227	227	6.00	6.00	227	227	6.00	6.00	0	0	.00	.00	0	0	.00	.00
3.12 %	0	2530	0.0	744	777	2760	0.0	855	866	2480	0.0	713	746	2680	0.0	813	823
Ar(in²)	11	2370	0.2	669	699	2570	0.2	769	780	2310	0.2	642	671	2490	0.2	731	740
=12.48	13	2310	0.3	585	612	2490	0.3	673	682	2250	0.3	561	587	2410	0.3	640	648
	17	2160	0.4	502	524	2320	0.4	577	585	2100	0.4	481	503	2240	0.4	548	555
8-#11	21	1990	0.5	418	437	2120	0.5	480	487	1920	0.5	401	419	2040	0.5	457	462
2x-4y	25	1800	0.7	251	262	1900	0.7	288	292	1730	0.7	240	251	1820	0.7	274	277
	40	1050	0.9	83	87	1060	0.9	96	97	986	0.9	80	83	987	0.9	91	92
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		226	226	6.00	6.00	226	226	6.00	6.00	211	211	6.00	6.00	211	211	6.00	6.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 20

Designation		W 10 x112								W 10 x100							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.60 %	0	2580	0.0	648	603	2970	0.0	822	711	2490	0.0	596	569	2840	0.0	750	670
Ar(in²)	11	2460	0.2	583	543	2810	0.2	739	640	2370	0.2	537	512	2680	0.2	675	603
= 2.40	13	2420	0.3	510	475	2750	0.3	647	560	2320	0.3	469	448	2620	0.3	590	528
	17	2300	0.4	437	407	2610	0.4	554	480	2210	0.4	402	384	2480	0.4	506	452
4-# 7	21	2170	0.5	364	339	2440	0.5	462	400	2080	0.5	335	320	2310	0.5	421	377
2x-2y	25	2020	0.7	218	203	2240	0.7	277	240	1930	0.7	201	192	2120	0.7	253	226
	40	1380	0.9	72	67	1440	0.9	92	80	1290	0.9	67	64	1350	0.9	84	75
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		324	324	6.00	6.00	324	324	6.00	6.00	300	300	6.00	6.00	300	300	6.00	6.00
1.00 %	0	2630	0.0	700	655	3020	0.0	874	762	2540	0.0	648	620	2890	0.0	802	721
Ar(in²)	11	2510	0.2	630	589	2860	0.2	786	686	2410	0.2	583	558	2730	0.2	721	649
= 4.00	13	2460	0.3	552	515	2800	0.3	688	600	2370	0.3	510	488	2670	0.3	631	568
	17	2340	0.4	473	442	2650	0.4	589	514	2250	0.4	437	418	2520	0.4	541	487
4-# 9	21	2210	0.5	394	368	2470	0.5	491	428	2110	0.5	364	349	2340	0.5	451	405
2x-2y	25	2050	0.7	236	221	2270	0.7	294	257	1960	0.7	218	209	2150	0.7	270	243
	40	1390	0.9	78	73	1450	0.9	98	85	1300	0.9	72	69	1350	0.9	90	81
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		323	323	6.00	6.00	323	323	6.00	6.00	299	299	6.00	6.00	299	299	6.00	6.00
2.00 %	0	2760	0.0	834	720	3150	0.0	1010	827	2660	0.0	782	685	3010	0.0	935	786
Ar(in²)	11	2620	0.2	750	648	2970	0.2	906	744	2530	0.2	704	617	2840	0.2	841	707
= 8.00	13	2570	0.3	657	567	2900	0.3	793	651	2470	0.3	616	539	2770	0.3	736	619
	17	2440	0.4	563	486	2740	0.4	679	558	2350	0.4	528	462	2610	0.4	631	530
8-# 9	21	2290	0.5	469	405	2550	0.5	566	465	2200	0.5	440	385	2420	0.5	526	442
4x-2y	25	2120	0.7	281	243	2330	0.7	339	279	2020	0.7	264	231	2210	0.7	315	265
	40	1410	0.9	93	81	1460	0.9	113	93	1320	0.9	88	77	1360	0.9	105	88
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		322	322	6.00	6.00	322	322	6.00	6.00	298	298	6.00	6.00	298	298	6.00	6.00
3.00 %	0	2880	0.0	919	851	3280	0.0	1090	957	2790	0.0	867	817	3140	0.0	1020	917
Ar(in²)	11	2730	0.2	827	766	3080	0.2	983	862	2640	0.2	780	735	2950	0.2	918	826
=12.00	13	2680	0.3	724	670	3010	0.3	860	754	2580	0.3	683	643	2880	0.3	803	722
	17	2540	0.4	620	574	2830	0.4	737	646	2440	0.4	585	551	2700	0.4	689	619
12-# 9	21	2370	0.5	517	479	2630	0.5	614	538	2280	0.5	488	459	2500	0.5	574	516
4x-4y	25	2190	0.7	310	287	2390	0.7	368	323	2090	0.7	292	275	2270	0.7	344	309
	40	1420	0.9	103	95	1470	0.9	122	107	1330	0.9	97	91	1370	0.9	114	103
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		321	321	6.00	6.00	321	321	6.00	6.00	297	297	6.00	6.00	297	297	6.00	6.00
3.81 %	0	2990	0.0	1010	924	3380	0.0	1180	1030	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	2830	0.2	909	831	3170	0.2	1060	927	0	0.2	0	0	0	0.2	0	0
=15.24	13	2760	0.3	795	727	3090	0.3	928	811	0	0.3	0	0	0	0.3	0	0
	17	2620	0.4	682	623	2910	0.4	796	695	0	0.4	0	0	0	0.4	0	0
12-#10	21	2440	0.5	568	519	2690	0.5	663	579	0	0.5	0	0	0	0.5	0	0
4x-4y	25	2240	0.7	341	311	2440	0.7	398	347	0	0.7	0	0	0	0.7	0	0
	40	1440	0.9	113	103	1470	0.9	132	115	0	0.9	0	0	0	0.9	0	0
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		321	321	6.00	6.00	321	321	6.00	6.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 20

Designation		W 10 x 88								W 10 x 77							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.60 %	0	2390	0.0	546	532	2700	0.0	680	628	2310	0.0	499	496	2580	0.0	616	586
Ar(in²)	11	2270	0.2	491	479	2550	0.2	612	565	2190	0.2	449	446	2420	0.2	554	527
= 2.40	13	2230	0.3	430	419	2490	0.3	535	494	2140	0.3	393	390	2370	0.3	485	461
	17	2120	0.4	368	359	2350	0.4	459	424	2030	0.4	337	334	2230	0.4	416	395
4-# 7	21	1980	0.5	307	299	2180	0.5	382	353	1890	0.5	281	279	2070	0.5	346	329
2x-2y	25	1830	0.7	184	179	2000	0.7	229	212	1740	0.7	168	167	1880	0.7	208	197
	40	1210	0.9	61	59	1250	0.9	76	70	1130	0.9	56	55	1160	0.9	69	65
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		275	275	6.00	6.00	275	275	6.00	6.00	253	253	6.00	6.00	253	253	6.00	6.00
1.00 %	0	2450	0.0	598	584	2750	0.0	732	679	2360	0.0	551	547	2630	0.0	668	638
Ar(in²)	11	2320	0.2	538	525	2590	0.2	658	611	2230	0.2	496	493	2470	0.2	601	574
= 4.00	13	2270	0.3	470	460	2530	0.3	576	535	2180	0.3	434	431	2410	0.3	526	502
	17	2160	0.4	403	394	2390	0.4	494	458	2060	0.4	372	369	2270	0.4	451	430
4-# 9	21	2020	0.5	336	328	2220	0.5	411	382	1930	0.5	310	308	2100	0.5	375	358
2x-2y	25	1860	0.7	201	197	2020	0.7	247	229	1770	0.7	186	184	1910	0.7	225	215
	40	1220	0.9	67	65	1250	0.9	82	76	1130	0.9	62	61	1160	0.9	75	71
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		275	275	6.00	6.00	275	275	6.00	6.00	252	252	6.00	6.00	252	252	6.00	6.00
2.00 %	0	2570	0.0	731	649	2880	0.0	865	744	2480	0.0	685	612	2750	0.0	801	703
Ar(in²)	11	2430	0.2	658	584	2710	0.2	779	670	2340	0.2	616	551	2580	0.2	721	632
= 8.00	13	2380	0.3	576	511	2640	0.3	681	586	2290	0.3	539	482	2510	0.3	631	553
	17	2250	0.4	493	438	2480	0.4	584	502	2160	0.4	462	413	2360	0.4	541	474
8-# 9	21	2100	0.5	411	365	2290	0.5	486	418	2010	0.5	385	344	2170	0.5	450	395
4x-2y	25	1930	0.7	246	219	2090	0.7	292	251	1830	0.7	231	206	1970	0.7	270	237
	40	1230	0.9	82	73	1260	0.9	97	83	1140	0.9	77	68	1160	0.9	90	79
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		274	274	6.00	6.00	274	274	6.00	6.00	251	251	6.00	6.00	251	251	6.00	6.00
3.00 %	0	2700	0.0	817	781	3010	0.0	950	875	2610	0.0	771	745	2880	0.0	887	834
Ar(in²)	11	2540	0.2	735	703	2820	0.2	855	788	2450	0.2	694	671	2690	0.2	798	751
=12.00	13	2490	0.3	643	615	2740	0.3	748	689	2390	0.3	607	587	2620	0.3	698	657
	17	2340	0.4	551	527	2570	0.4	641	591	2250	0.4	520	503	2450	0.4	598	563
12-# 9	21	2180	0.5	459	439	2370	0.5	534	492	2080	0.5	433	419	2240	0.5	499	469
4x-4y	25	1990	0.7	275	263	2140	0.7	320	295	1900	0.7	260	251	2020	0.7	299	281
	40	1240	0.9	91	87	1260	0.9	106	98	1150	0.9	86	83	1170	0.9	99	93
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		273	273	6.00	6.00	273	273	6.00	6.00	250	250	6.00	6.00	250	250	6.00	6.00
4.00 %	0	2820	0.0	951	934	3130	0.0	1090	1030	2740	0.0	905	899	3010	0.0	1020	986
Ar(in²)	11	2660	0.2	856	840	2930	0.2	976	924	2560	0.2	814	809	2800	0.2	919	887
=16.00	13	2590	0.3	749	735	2850	0.3	854	808	2500	0.3	712	708	2720	0.3	804	776
	17	2440	0.4	642	630	2660	0.4	732	693	2340	0.4	611	606	2530	0.4	689	665
4-#18	21	2260	0.5	535	525	2440	0.5	610	577	2160	0.5	509	505	2310	0.5	574	554
2x-2y	25	2050	0.7	321	315	2200	0.7	366	346	1950	0.7	305	303	2080	0.7	344	332
	40	1250	0.9	107	105	1270	0.9	122	115	1150	0.9	101	101	1160	0.9	114	110
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		272	272	6.00	6.00	272	272	6.00	6.00	249	249	6.00	6.00	249	249	6.00	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 20

Designation		W 10 x 68								W 10 x 60							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.60 %	0	2240	0.0	462	464	2480	0.0	564	549	2170	0.0	429	434	2380	0.0	520	515
Ar(in²)	11	2110	0.2	416	417	2330	0.2	508	494	2050	0.2	386	390	2230	0.2	468	463
= 2.40	13	2070	0.3	364	365	2270	0.3	444	433	2000	0.3	338	341	2180	0.3	409	405
	17	1950	0.4	312	313	2130	0.4	381	371	1890	0.4	290	293	2040	0.4	351	347
4-# 7	21	1820	0.5	260	261	1970	0.5	317	309	1750	0.5	241	244	1880	0.5	292	289
2x-2y	25	1670	0.7	156	156	1790	0.7	190	185	1600	0.7	145	146	1700	0.7	175	173
	40	1060	0.9	52	52	1080	0.9	63	61	992	0.9	48	48	1010	0.9	58	57
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		235	235	6.00	6.00	235	235	6.00	6.00	218	218	6.00	6.00	218	218	6.00	6.00
1.00 %	0	2290	0.0	514	516	2530	0.0	616	601	2230	0.0	482	486	2430	0.0	572	567
Ar(in²)	11	2160	0.2	462	464	2370	0.2	555	541	2090	0.2	433	437	2280	0.2	515	510
= 4.00	13	2110	0.3	405	406	2310	0.3	485	473	2040	0.3	379	382	2220	0.3	450	446
	17	1990	0.4	347	348	2170	0.4	416	405	1920	0.4	325	328	2080	0.4	386	382
4-# 9	21	1850	0.5	289	290	2000	0.5	347	338	1780	0.5	271	273	1910	0.5	322	319
2x-2y	25	1700	0.7	173	174	1810	0.7	208	202	1630	0.7	162	164	1730	0.7	193	191
	40	1060	0.9	57	58	1080	0.9	69	67	996	0.9	54	54	1010	0.9	64	63
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		234	234	6.00	6.00	234	234	6.00	6.00	218	218	6.00	6.00	218	218	6.00	6.00
2.00 %	0	2420	0.0	647	581	2650	0.0	750	666	2350	0.0	615	557	2560	0.0	705	632
Ar(in²)	11	2270	0.2	583	523	2480	0.2	675	599	2200	0.2	553	501	2390	0.2	635	568
= 8.00	13	2220	0.3	510	457	2410	0.3	590	524	2150	0.3	484	438	2320	0.3	555	497
	17	2090	0.4	437	392	2260	0.4	506	449	2020	0.4	415	376	2170	0.4	476	426
8-# 9	21	1930	0.5	364	326	2070	0.5	422	374	1860	0.5	346	313	1980	0.5	396	355
4x-2y	25	1760	0.7	218	196	1870	0.7	253	224	1690	0.7	207	188	1780	0.7	238	213
	40	1070	0.9	72	65	1080	0.9	84	74	1000	0.9	69	62	1010	0.9	79	71
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		233	233	6.00	6.00	233	233	6.00	6.00	217	217	6.00	6.00	217	217	6.00	6.00
3.00 %	0	2540	0.0	734	714	2780	0.0	835	798	2480	0.0	702	689	2690	0.0	791	764
Ar(in²)	11	2380	0.2	660	642	2590	0.2	752	718	2310	0.2	632	620	2500	0.2	711	688
=12.00	13	2320	0.3	578	562	2520	0.3	658	628	2250	0.3	553	542	2420	0.3	622	602
	17	2180	0.4	495	482	2350	0.4	564	539	2110	0.4	474	465	2250	0.4	533	516
12-# 9	21	2010	0.5	413	401	2140	0.5	470	449	1930	0.5	395	387	2050	0.5	444	430
4x-4y	25	1820	0.7	247	241	1920	0.7	282	269	1740	0.7	237	232	1830	0.7	266	258
	40	1080	0.9	82	80	1090	0.9	94	89	1000	0.9	79	77	1010	0.9	88	86
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		232	232	6.00	6.00	232	232	6.00	6.00	216	216	6.00	6.00	216	216	6.00	6.00
4.00 %	0	2670	0.0	868	868	2910	0.0	969	950	2600	0.0	835	839	2810	0.0	925	917
Ar(in²)	11	2490	0.2	781	781	2700	0.2	872	855	2420	0.2	752	755	2600	0.2	833	825
=16.00	13	2420	0.3	683	683	2620	0.3	763	748	2360	0.3	658	661	2520	0.3	728	722
	17	2270	0.4	585	586	2430	0.4	654	641	2190	0.4	564	566	2340	0.4	624	619
4-#18	21	2080	0.5	488	488	2210	0.5	545	534	2000	0.5	470	472	2120	0.5	520	516
2x-2y	25	1870	0.7	292	293	1980	0.7	327	320	1790	0.7	282	283	1880	0.7	312	309
	40	1080	0.9	97	97	1080	0.9	109	106	1000	0.9	94	94	1000	0.9	104	103
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		231	231	6.00	6.00	231	231	6.00	6.00	215	215	6.00	6.00	215	215	6.00	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 20

Designation		W 8 x 67								W 8 x 58							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.60 %	0	2230	0.0	455	459	2460	0.0	543	534	2160	0.0	424	429	2360	0.0	500	500
Ar(in²)	11	2110	0.2	409	413	2310	0.2	489	481	2040	0.2	381	386	2210	0.2	450	450
= 2.40	13	2060	0.3	358	361	2260	0.3	427	421	1990	0.3	334	338	2160	0.3	394	394
	17	1950	0.4	307	310	2120	0.4	366	360	1870	0.4	286	289	2020	0.4	337	338
4-# 7	21	1810	0.5	256	258	1960	0.5	305	300	1740	0.5	238	241	1860	0.5	281	281
2x-2y	25	1660	0.7	153	155	1780	0.7	183	180	1590	0.7	143	144	1690	0.7	168	169
	40	1050	0.9	51	51	1070	0.9	61	60	979	0.9	47	48	994	0.9	56	56
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		233	233	6.00	6.00	233	233	6.00	6.00	215	215	6.00	6.00	215	215	6.00	6.00
1.00 %	0	2280	0.0	507	511	2520	0.0	595	586	2210	0.0	476	481	2420	0.0	552	552
Ar(in²)	11	2150	0.2	456	460	2360	0.2	535	527	2080	0.2	428	433	2260	0.2	497	497
= 4.00	13	2100	0.3	399	402	2300	0.3	468	461	2030	0.3	375	379	2200	0.3	435	435
	17	1980	0.4	342	345	2160	0.4	401	395	1910	0.4	321	324	2060	0.4	372	372
4-# 9	21	1840	0.5	285	287	1990	0.5	334	329	1770	0.5	267	270	1890	0.5	310	310
2x-2y	25	1690	0.7	171	172	1800	0.7	200	197	1610	0.7	160	162	1710	0.7	186	186
	40	1050	0.9	57	57	1070	0.9	66	65	982	0.9	53	54	995	0.9	62	62
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		232	232	6.00	6.00	232	232	6.00	6.00	214	214	6.00	6.00	214	214	6.00	6.00
2.00 %	0	2410	0.0	640	576	2640	0.0	727	651	2340	0.0	609	546	2540	0.0	685	617
Ar(in²)	11	2260	0.2	576	518	2470	0.2	655	586	2190	0.2	548	491	2370	0.2	616	555
= 8.00	13	2210	0.3	504	453	2400	0.3	573	512	2130	0.3	479	430	2300	0.3	539	486
	17	2080	0.4	432	388	2250	0.4	491	439	2000	0.4	411	368	2150	0.4	462	416
8-# 9	21	1920	0.5	360	324	2060	0.5	409	366	1840	0.5	342	307	1960	0.5	385	347
4x-2y	25	1750	0.7	216	194	1860	0.7	245	219	1670	0.7	205	184	1760	0.7	231	208
	40	1060	0.9	72	64	1080	0.9	81	73	987	0.9	68	61	995	0.9	77	69
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		231	231	6.00	6.00	231	231	6.00	6.00	213	213	6.00	6.00	213	213	6.00	6.00
3.00 %	0	2530	0.0	725	708	2770	0.0	813	782	2460	0.0	694	679	2670	0.0	770	749
Ar(in²)	11	2370	0.2	653	637	2580	0.2	731	704	2300	0.2	625	611	2480	0.2	693	674
=12.00	13	2310	0.3	571	558	2510	0.3	640	616	2240	0.3	546	534	2400	0.3	606	590
	17	2170	0.4	489	478	2330	0.4	548	528	2090	0.4	468	458	2230	0.4	520	506
12-# 9	21	2000	0.5	408	398	2130	0.5	457	440	1920	0.5	390	382	2030	0.5	433	421
4x-4y	25	1810	0.7	244	239	1910	0.7	274	264	1730	0.7	234	229	1810	0.7	260	253
	40	1070	0.9	81	79	1070	0.9	91	88	989	0.9	78	76	991	0.9	86	84
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		230	230	6.00	6.00	230	230	6.00	6.00	212	212	6.00	6.00	212	212	6.00	6.00
4.00 %	0	2660	0.0	859	862	2890	0.0	946	934	2590	0.0	827	833	2790	0.0	903	901
Ar(in²)	11	2480	0.2	773	775	2690	0.2	851	840	2410	0.2	745	749	2580	0.2	813	811
=16.00	13	2420	0.3	676	678	2610	0.3	745	735	2340	0.3	652	656	2500	0.3	711	710
	17	2260	0.4	579	581	2420	0.4	638	630	2180	0.4	558	562	2320	0.4	609	608
4-#18	21	2070	0.5	483	484	2200	0.5	532	525	1990	0.5	465	468	2100	0.5	508	507
2x-2y	25	1860	0.7	289	290	1960	0.7	319	315	1780	0.7	279	281	1860	0.7	304	304
	40	1070	0.9	96	96	1070	0.9	106	105	986	0.9	93	93	986	0.9	101	101
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		229	229	6.00	6.00	229	229	6.00	6.00	211	211	6.00	6.00	211	211	6.00	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 18 x 20

Designation		W 12 x 79								W 12 x 72							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.67 %	0	2160	0.0	516	450	2440	0.0	656	543	2100	0.0	483	426	2360	0.0	609	514
Ar(in^2)	11	2030	0.2	465	405	2270	0.2	590	489	1970	0.2	434	383	2190	0.2	548	463
= 2.40	13	1970	0.3	406	354	2200	0.3	517	427	1920	0.3	380	335	2120	0.3	480	405
	17	1850	0.4	348	304	2050	0.4	443	366	1800	0.4	326	287	1970	0.4	411	347
4-# 7	21	1710	0.5	290	253	1870	0.5	369	305	1650	0.5	271	239	1800	0.5	343	289
2x-2y	25	1550	0.7	174	152	1680	0.7	221	183	1490	0.7	163	143	1600	0.7	205	173
	40	924	0.9	58	50	934	0.9	73	61	874	0.9	54	47	879	0.9	68	57
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		247	200	6.00	5.40	247	200	6.00	5.40	232	188	6.00	5.40	232	188	6.00	5.40
.67 %	0	2160	0.0	516	450	2440	0.0	656	543	0	0.0	0	0	0	0.0	0	0
Ar(in^2)	11	2030	0.2	465	405	2270	0.2	590	489	0	0.2	0	0	0	0.2	0	0
= 2.40	13	1970	0.3	406	354	2200	0.3	517	427	0	0.3	0	0	0	0.3	0	0
	17	1850	0.4	348	304	2050	0.4	443	366	0	0.4	0	0	0	0.4	0	0
4-# 7	21	1710	0.5	290	253	1870	0.5	369	305	0	0.5	0	0	0	0.5	0	0
2x-2y	25	1550	0.7	174	152	1680	0.7	221	183	0	0.7	0	0	0	0.7	0	0
	40	924	0.9	58	50	934	0.9	73	61	0	0.9	0	0	0	0.9	0	0
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		247	200	6.00	5.40	247	200	6.00	5.40	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in^2)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in^2)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in^2)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 8.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 18 x 20

Designation		W 12 x 65								W 12 x 58							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.67 %	0	2050	0.0	449	401	2280	0.0	563	485	2000	0.0	417	370	2200	0.0	520	441
Ar(in²)	11	1910	0.2	404	361	2110	0.2	507	436	1860	0.2	376	333	2030	0.2	468	397
= 2.40	13	1860	0.3	354	316	2050	0.3	443	381	1810	0.3	329	291	1970	0.3	409	347
	17	1740	0.4	303	271	1900	0.4	380	327	1680	0.4	282	250	1820	0.4	351	298
4-# 7	21	1600	0.5	252	225	1720	0.5	317	272	1540	0.5	235	208	1650	0.5	292	248
2x-2y	25	1440	0.7	151	135	1530	0.7	190	163	1380	0.7	141	125	1460	0.7	175	149
	40	825	0.9	50	45	827	0.9	63	54	772	0.9	47	41	772	0.9	58	49
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		219	177	6.00	5.40	219	177	6.00	5.40	204	165	6.00	5.40	204	165	6.00	5.40
.88 %	0	2080	0.0	474	423	2300	0.0	588	506	2020	0.0	443	392	2220	0.0	545	463
Ar(in²)	11	1940	0.2	427	380	2130	0.2	529	455	1880	0.2	398	353	2050	0.2	490	417
= 3.16	13	1880	0.3	373	333	2070	0.3	463	398	1820	0.3	348	309	1990	0.3	429	364
	17	1760	0.4	320	285	1910	0.4	397	341	1700	0.4	299	264	1840	0.4	368	312
4-# 8	21	1610	0.5	267	238	1740	0.5	331	284	1550	0.5	249	220	1660	0.5	306	260
2x-2y	25	1450	0.7	160	142	1540	0.7	198	170	1390	0.7	149	132	1470	0.7	184	156
	40	825	0.9	53	47	826	0.9	66	56	771	0.9	49	44	771	0.9	61	52
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		218	177	6.00	5.40	218	177	6.00	5.40	204	165	6.00	5.40	204	165	6.00	5.40
1.76 %	0	2180	0.0	581	474	2400	0.0	695	550	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	2020	0.2	523	426	2220	0.2	626	495	0	0.2	0	0	0	0.2	0	0
= 6.32	13	1960	0.3	458	373	2150	0.3	547	433	0	0.3	0	0	0	0.3	0	0
	17	1830	0.4	392	320	1980	0.4	469	371	0	0.4	0	0	0	0.4	0	0
8-# 8	21	1670	0.5	327	266	1790	0.5	391	309	0	0.5	0	0	0	0.5	0	0
4x-2y	25	1490	0.7	196	160	1580	0.7	234	185	0	0.7	0	0	0	0.7	0	0
	40	823	0.9	65	53	823	0.9	78	61	0	0.9	0	0	0	0.9	0	0
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		218	176	6.00	5.40	218	176	6.00	5.40	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) — Column Size(b x h): 18 x 20

Designation		W 12 x 53								W 12 x 50							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.67 %	0	1960	0.0	393	352	2140	0.0	486	420	1930	0.0	380	341	2110	0.0	468	401
Ar(in^2)	11	1820	0.2	354	317	1980	0.2	438	378	1790	0.2	342	307	1940	0.2	421	361
= 2.40	13	1770	0.3	310	277	1910	0.3	383	331	1740	0.3	299	269	1880	0.3	369	316
	17	1640	0.4	265	237	1770	0.4	328	283	1620	0.4	256	230	1730	0.4	316	270
4-# 7	21	1500	0.5	221	198	1600	0.5	273	236	1470	0.5	213	192	1560	0.5	263	225
2x-2y	25	1340	0.7	132	118	1410	0.7	164	141	1310	0.7	128	115	1380	0.7	158	135
	40	735	0.9	44	39	735	0.9	54	47	712	0.9	42	38	712	0.9	52	45
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		194	157	6.00	5.40	194	157	6.00	5.40	188	152	6.00	5.40	188	152	6.00	5.40
1.11 %	0	2010	0.0	446	397	2190	0.0	539	465	1990	0.0	432	386	2160	0.0	521	446
Ar(in^2)	11	1860	0.2	401	357	2020	0.2	485	418	1840	0.2	389	348	1990	0.2	469	401
= 4.00	13	1810	0.3	351	313	1950	0.3	424	366	1780	0.3	340	304	1920	0.3	410	351
	17	1680	0.4	301	268	1800	0.4	364	314	1650	0.4	292	261	1770	0.4	351	301
4-# 9	21	1520	0.5	250	223	1620	0.5	303	261	1500	0.5	243	217	1590	0.5	293	251
2x-2y	25	1360	0.7	150	134	1430	0.7	182	157	1330	0.7	146	130	1400	0.7	175	150
	40	734	0.9	50	44	734	0.9	60	52	710	0.9	48	43	710	0.9	58	50
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		194	157	6.00	5.40	194	157	6.00	5.40	188	152	6.00	5.40	188	152	6.00	5.40
2.00 %	0	2110	0.0	538	465	2300	0.0	629	528	2090	0.0	525	450	2260	0.0	611	508
Ar(in^2)	11	1950	0.2	484	418	2100	0.2	566	475	1920	0.2	472	405	2070	0.2	550	457
= 7.20	13	1890	0.3	423	366	2030	0.3	495	416	1860	0.3	413	355	2000	0.3	481	400
	17	1740	0.4	363	314	1860	0.4	425	356	1720	0.4	354	304	1830	0.4	413	343
12-# 7	21	1580	0.5	302	261	1670	0.5	354	297	1550	0.5	295	253	1640	0.5	344	286
4x-4y	25	1400	0.7	181	157	1460	0.7	212	178	1370	0.7	177	152	1430	0.7	206	171
	40	731	0.9	60	52	731	0.9	70	59	707	0.9	59	50	707	0.9	68	57
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		193	156	6.00	5.40	193	156	6.00	5.40	187	151	6.00	5.40	187	151	6.00	5.40
2.67 %	0	2190	0.0	598	535	2370	0.0	688	598	0	0.0	0	0	0	0.0	0	0
Ar(in^2)	11	2010	0.2	538	481	2170	0.2	620	538	0	0.2	0	0	0	0.2	0	0
= 9.60	13	1950	0.3	471	421	2090	0.3	542	471	0	0.3	0	0	0	0.3	0	0
	17	1790	0.4	404	361	1910	0.4	465	404	0	0.4	0	0	0	0.4	0	0
16-# 7	21	1610	0.5	336	301	1710	0.5	387	336	0	0.5	0	0	0	0.5	0	0
4x-6y	25	1420	0.7	202	180	1490	0.7	232	202	0	0.7	0	0	0	0.7	0	0
	40	729	0.9	67	60	729	0.9	77	67	0	0.9	0	0	0	0.9	0	0
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		193	156	6.00	5.40	193	156	6.00	5.40	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in^2)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes :
1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 18 x 20

Designation		W 10 x112								W 10 x100							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.67 %	0	2420	0.0	637	532	2810	0.0	809	632	2320	0.0	584	500	2670	0.0	737	594
Ar(in^2)	11	2280	0.2	573	479	2630	0.2	728	568	2190	0.2	526	450	2500	0.2	663	534
= 2.40	13	2230	0.3	501	419	2560	0.3	637	497	2140	0.3	460	394	2430	0.3	580	468
	17	2110	0.4	429	359	2400	0.4	546	426	2020	0.4	394	337	2270	0.4	497	401
4-# 7	21	1970	0.5	358	299	2210	0.5	455	355	1880	0.5	329	281	2090	0.5	414	334
2x-2y	25	1810	0.7	214	179	2000	0.7	273	213	1710	0.7	197	168	1880	0.7	248	200
	40	1140	0.9	71	59	1180	0.9	91	71	1070	0.9	65	56	1090	0.9	82	66
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		314	254	6.00	5.40	314	254	6.00	5.40	290	235	6.00	5.40	290	235	6.00	5.40
1.11 %	0	2470	0.0	688	576	2860	0.0	861	676	2370	0.0	636	545	2720	0.0	789	638
Ar(in^2)	11	2330	0.2	620	518	2670	0.2	775	608	2240	0.2	573	490	2540	0.2	710	574
= 4.00	13	2280	0.3	542	454	2600	0.3	678	532	2180	0.3	501	429	2470	0.3	621	502
	17	2150	0.4	465	389	2440	0.4	581	456	2060	0.4	429	368	2310	0.4	532	430
4-# 9	21	2000	0.5	387	324	2240	0.5	484	380	1910	0.5	358	306	2120	0.5	444	359
2x-2y	25	1830	0.7	232	194	2020	0.7	290	228	1740	0.7	214	184	1910	0.7	266	215
	40	1150	0.9	77	64	1180	0.9	96	76	1070	0.9	71	61	1090	0.9	88	71
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		314	254	6.00	5.40	314	254	6.00	5.40	289	234	6.00	5.40	289	234	6.00	5.40
2.00 %	0	2570	0.0	775	639	2960	0.0	947	738	2480	0.0	723	607	2830	0.0	876	701
Ar(in^2)	11	2420	0.2	697	575	2760	0.2	853	664	2330	0.2	651	546	2630	0.2	788	630
= 7.20	13	2360	0.3	610	503	2690	0.3	746	581	2270	0.3	569	478	2560	0.3	689	552
	17	2220	0.4	523	431	2510	0.4	639	498	2130	0.4	488	410	2380	0.4	591	473
12-# 7	21	2060	0.5	436	359	2300	0.5	533	415	1970	0.5	406	341	2170	0.5	492	394
4x-4y	25	1880	0.7	261	215	2070	0.7	319	249	1790	0.7	244	205	1950	0.7	295	236
	40	1160	0.9	87	71	1180	0.9	106	83	1080	0.9	81	68	1090	0.9	98	78
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		313	253	6.00	5.40	313	253	6.00	5.40	289	234	6.00	5.40	289	234	6.00	5.40
2.82 %	0	2660	0.0	891	652	3050	0.0	1060	751	2570	0.0	839	623	2920	0.0	991	714
Ar(in^2)	11	2500	0.2	802	587	2840	0.2	956	676	2410	0.2	755	561	2710	0.2	892	642
=10.16	13	2440	0.3	701	514	2760	0.3	837	592	2340	0.3	660	491	2630	0.3	780	562
	17	2290	0.4	601	440	2570	0.4	717	507	2200	0.4	566	421	2440	0.4	669	482
8-#10	21	2120	0.5	501	367	2350	0.5	598	422	2020	0.5	472	350	2230	0.5	557	401
4x-2y	25	1930	0.7	300	220	2110	0.7	358	253	1830	0.7	283	210	1990	0.7	334	241
	40	1160	0.9	100	73	1180	0.9	119	84	1080	0.9	94	70	1090	0.9	111	80
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		312	253	6.00	5.40	312	253	6.00	5.40	288	233	6.00	5.40	288	233	6.00	5.40
4.23 %	0	2820	0.0	996	796	3210	0.0	1160	894	2730	0.0	945	766	3080	0.0	1090	857
Ar(in^2)	11	2640	0.2	896	716	2980	0.2	1050	805	2550	0.2	850	689	2850	0.2	984	771
=15.24	13	2570	0.3	784	626	2890	0.3	917	704	2480	0.3	744	603	2760	0.3	861	675
	17	2410	0.4	672	537	2680	0.4	786	603	2310	0.4	638	517	2550	0.4	738	578
12-#10	21	2210	0.5	560	447	2440	0.5	655	503	2120	0.5	531	431	2310	0.5	615	482
4x-4y	25	2000	0.7	336	268	2170	0.7	393	301	1900	0.7	319	258	2050	0.7	369	289
	40	1170	0.9	112	89	1180	0.9	131	100	1080	0.9	106	86	1080	0.9	123	96
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		311	252	6.00	5.40	311	252	6.00	5.40	287	232	6.00	5.40	287	232	6.00	5.40

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 18 x 20

Designation		W 10 x 88								W 10 x 77							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.67 %	0	2230	0.0	534	467	2540	0.0	667	555	2140	0.0	488	434	2410	0.0	604	516
Ar(in²)	11	2100	0.2	480	420	2370	0.2	600	499	2010	0.2	439	391	2240	0.2	543	464
= 2.40	13	2050	0.3	420	368	2300	0.3	525	437	1960	0.3	384	342	2180	0.3	475	406
	17	1930	0.4	360	315	2150	0.4	450	374	1840	0.4	329	293	2030	0.4	407	348
4-# 7	21	1780	0.5	300	262	1970	0.5	375	312	1690	0.5	274	244	1850	0.5	339	290
2x-2y	25	1620	0.7	180	157	1770	0.7	225	187	1530	0.7	164	146	1660	0.7	203	174
	40	987	0.9	60	52	1000	0.9	75	62	910	0.9	54	48	918	0.9	67	58
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		266	215	6.00	5.40	266	215	6.00	5.40	243	197	6.00	5.40	243	197	6.00	5.40
1.11 %	0	2280	0.0	586	512	2590	0.0	719	599	2190	0.0	540	479	2460	0.0	656	561
Ar(in²)	11	2140	0.2	527	461	2410	0.2	647	539	2050	0.2	486	431	2290	0.2	590	504
= 4.00	13	2090	0.3	461	403	2340	0.3	566	472	2000	0.3	425	377	2220	0.3	516	441
	17	1960	0.4	395	345	2180	0.4	485	404	1870	0.4	364	323	2060	0.4	442	378
4-# 9	21	1810	0.5	329	288	1990	0.5	404	337	1720	0.5	303	269	1880	0.5	369	315
2x-2y	25	1650	0.7	197	172	1790	0.7	242	202	1560	0.7	182	161	1680	0.7	221	189
	40	989	0.9	65	57	1000	0.9	80	67	911	0.9	60	53	916	0.9	73	63
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		265	215	6.00	5.40	265	215	6.00	5.40	242	196	6.00	5.40	242	196	6.00	5.40
2.00 %	0	2380	0.0	673	574	2690	0.0	806	661	2300	0.0	626	542	2560	0.0	742	623
Ar(in²)	11	2230	0.2	605	517	2500	0.2	725	595	2140	0.2	564	487	2370	0.2	668	561
= 7.20	13	2170	0.3	530	452	2420	0.3	635	521	2080	0.3	493	426	2300	0.3	584	491
	17	2030	0.4	454	387	2250	0.4	544	446	1940	0.4	423	365	2130	0.4	501	420
12-# 7	21	1870	0.5	378	323	2050	0.5	453	372	1780	0.5	352	304	1930	0.5	417	350
4x-4y	25	1690	0.7	227	193	1830	0.7	272	223	1600	0.7	211	182	1720	0.7	250	210
	40	993	0.9	75	64	1000	0.9	90	74	913	0.9	70	60	913	0.9	83	70
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		264	214	6.00	5.40	264	214	6.00	5.40	242	196	6.00	5.40	242	196	6.00	5.40
2.82 %	0	2480	0.0	788	596	2790	0.0	921	675	2390	0.0	742	571	2660	0.0	858	637
Ar(in²)	11	2310	0.2	709	537	2580	0.2	829	607	2220	0.2	668	514	2450	0.2	772	573
=10.16	13	2250	0.3	621	470	2500	0.3	725	531	2160	0.3	584	450	2370	0.3	675	501
	17	2100	0.4	532	402	2310	0.4	622	455	2010	0.4	501	385	2190	0.4	579	430
8-#10	21	1930	0.5	443	335	2100	0.5	518	379	1830	0.5	417	321	1980	0.5	482	358
4x-2y	25	1730	0.7	266	201	1870	0.7	311	227	1640	0.7	250	192	1750	0.7	289	215
	40	995	0.9	88	67	997	0.9	103	75	911	0.9	83	64	911	0.9	96	71
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		264	214	6.00	5.40	264	214	6.00	5.40	241	195	6.00	5.40	241	195	6.00	5.40
4.23 %	0	2640	0.0	895	739	2950	0.0	1030	818	2550	0.0	850	714	2820	0.0	962	780
Ar(in²)	11	2450	0.2	806	665	2710	0.2	922	736	2360	0.2	765	643	2590	0.2	866	702
=15.24	13	2380	0.3	705	582	2630	0.3	807	644	2290	0.3	669	562	2500	0.3	757	614
	17	2210	0.4	604	499	2420	0.4	692	552	2120	0.4	574	482	2290	0.4	649	526
12-#10	21	2020	0.5	503	415	2180	0.5	576	460	1920	0.5	478	401	2060	0.5	541	439
4x-4y	25	1800	0.7	302	249	1920	0.7	346	276	1700	0.7	287	241	1800	0.7	324	263
	40	992	0.9	100	83	992	0.9	115	92	906	0.9	95	80	906	0.9	108	87
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		263	213	6.00	5.40	263	213	6.00	5.40	240	194	6.00	5.40	240	194	6.00	5.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 18 x 20

Designation		W 10 x 68								W 10 x 60							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.67 %	0	2080	0.0	450	405	2310	0.0	552	483	2010	0.0	418	378	2220	0.0	508	451
Ar(in^2)	11	1940	0.2	405	365	2140	0.2	497	434	1870	0.2	376	341	2050	0.2	457	406
= 2.40	13	1890	0.3	355	319	2080	0.3	435	380	1820	0.3	329	298	1990	0.3	400	355
	17	1770	0.4	304	273	1930	0.4	373	326	1700	0.4	282	255	1840	0.4	343	305
4-# 7	21	1620	0.5	253	228	1760	0.5	310	271	1550	0.5	235	213	1670	0.5	285	254
2x-2y	25	1460	0.7	152	136	1570	0.7	186	163	1390	0.7	141	127	1480	0.7	171	152
	40	847	0.9	50	45	850	0.9	62	54	788	0.9	47	42	787	0.9	57	50
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		225	182	6.00	5.40	225	182	6.00	5.40	208	169	6.00	5.40	208	169	6.00	5.40
1.11 %	0	2130	0.0	502	450	2360	0.0	604	527	2060	0.0	470	424	2270	0.0	560	496
Ar(in^2)	11	1980	0.2	452	405	2190	0.2	544	474	1920	0.2	423	381	2100	0.2	504	446
= 4.00	13	1930	0.3	396	354	2120	0.3	476	415	1860	0.3	370	333	2030	0.3	441	391
	17	1800	0.4	339	304	1970	0.4	408	356	1730	0.4	317	286	1880	0.4	378	335
4-# 9	21	1650	0.5	282	253	1780	0.5	340	296	1580	0.5	264	238	1700	0.5	315	279
2x-2y	25	1480	0.7	169	152	1590	0.7	204	178	1420	0.7	158	143	1500	0.7	189	167
	40	848	0.9	56	50	849	0.9	68	59	786	0.9	52	47	786	0.9	63	55
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		224	182	6.00	5.40	224	182	6.00	5.40	208	168	6.00	5.40	208	168	6.00	5.40
2.00 %	0	2230	0.0	589	513	2460	0.0	691	590	2160	0.0	557	487	2370	0.0	646	559
Ar(in^2)	11	2070	0.2	530	462	2270	0.2	622	531	2000	0.2	501	438	2180	0.2	582	503
= 7.20	13	2010	0.3	464	404	2200	0.3	544	464	1940	0.3	438	383	2110	0.3	509	440
	17	1870	0.4	397	346	2030	0.4	466	398	1800	0.4	376	328	1940	0.4	436	377
12-# 7	21	1710	0.5	331	288	1840	0.5	388	332	1640	0.5	313	274	1750	0.5	363	314
4x-4y	25	1530	0.7	198	173	1620	0.7	233	199	1460	0.7	188	164	1540	0.7	218	188
	40	846	0.9	66	57	846	0.9	77	66	783	0.9	62	54	783	0.9	72	62
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		224	181	6.00	5.40	224	181	6.00	5.40	207	168	6.00	5.40	207	168	6.00	5.40
2.82 %	0	2320	0.0	705	551	2560	0.0	806	608	2260	0.0	673	533	2470	0.0	762	584
Ar(in^2)	11	2150	0.2	634	496	2350	0.2	726	547	2080	0.2	605	480	2260	0.2	686	525
=10.16	13	2090	0.3	555	434	2270	0.3	635	479	2020	0.3	530	420	2180	0.3	600	460
	17	1930	0.4	476	372	2090	0.4	544	410	1860	0.4	454	360	2000	0.4	514	394
8-#10	21	1760	0.5	396	310	1880	0.5	453	342	1680	0.5	378	300	1790	0.5	428	328
4x-2y	25	1560	0.7	238	186	1660	0.7	272	205	1490	0.7	227	180	1570	0.7	257	197
	40	843	0.9	79	62	843	0.9	90	68	780	0.9	75	60	780	0.9	85	65
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		223	181	6.00	5.40	223	181	6.00	5.40	206	167	6.00	5.40	206	167	6.00	5.40
4.23 %	0	2480	0.0	814	694	2720	0.0	912	751	2420	0.0	782	676	2630	0.0	868	726
Ar(in^2)	11	2290	0.2	732	624	2490	0.2	820	676	2220	0.2	704	608	2390	0.2	781	654
=15.24	13	2210	0.3	641	546	2400	0.3	718	591	2140	0.3	616	532	2300	0.3	683	572
	17	2040	0.4	549	468	2190	0.4	615	507	1970	0.4	528	456	2100	0.4	586	490
12-#10	21	1840	0.5	458	390	1960	0.5	513	422	1760	0.5	440	380	1870	0.5	488	408
4x-4y	25	1620	0.7	274	234	1710	0.7	307	253	1550	0.7	264	228	1620	0.7	293	245
	40	838	0.9	91	78	838	0.9	102	84	776	0.9	88	76	776	0.9	97	81
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		222	180	6.00	5.40	222	180	6.00	5.40	205	166	6.00	5.40	205	166	6.00	5.40

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 18 x 20

Designation		W 10 x 54								W 10 x 49							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.67 %	0	1960	0.0	393	356	2150	0.0	474	426	1930	0.0	374	338	2100	0.0	448	405
Ar(in²)	11	1820	0.2	354	321	1990	0.2	426	383	1790	0.2	337	304	1930	0.2	403	364
= 2.40	13	1770	0.3	310	280	1920	0.3	373	335	1730	0.3	295	266	1870	0.3	352	319
	17	1650	0.4	265	240	1770	0.4	320	287	1610	0.4	253	228	1720	0.4	302	273
4-# 7	21	1500	0.5	221	200	1600	0.5	266	239	1460	0.5	210	190	1550	0.5	252	227
2x-2y	25	1340	0.7	132	120	1420	0.7	160	143	1300	0.7	126	114	1370	0.7	151	136
	40	741	0.9	44	40	741	0.9	53	47	704	0.9	42	38	704	0.9	50	45
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		196	159	6.00	5.40	196	159	6.00	5.40	186	151	6.00	5.40	186	151	6.00	5.40
1.11 %	0	2010	0.0	445	402	2200	0.0	526	470	1980	0.0	427	384	2150	0.0	500	450
Ar(in²)	11	1870	0.2	401	361	2030	0.2	473	423	1830	0.2	384	345	1970	0.2	450	405
= 4.00	13	1810	0.3	351	316	1960	0.3	414	370	1770	0.3	336	302	1910	0.3	393	354
	17	1680	0.4	301	271	1810	0.4	355	317	1640	0.4	288	259	1750	0.4	337	303
4-# 9	21	1530	0.5	250	226	1630	0.5	296	264	1490	0.5	240	216	1580	0.5	281	253
2x-2y	25	1360	0.7	150	135	1440	0.7	177	158	1320	0.7	144	129	1390	0.7	168	151
	40	739	0.9	50	45	739	0.9	59	52	703	0.9	48	43	703	0.9	56	50
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		195	158	6.00	5.40	195	158	6.00	5.40	186	150	6.00	5.40	186	150	6.00	5.40
2.00 %	0	2120	0.0	532	469	2300	0.0	612	533	2080	0.0	513	455	2250	0.0	586	512
Ar(in²)	11	1950	0.2	479	422	2110	0.2	551	480	1910	0.2	462	409	2060	0.2	528	461
= 7.20	13	1890	0.3	419	369	2040	0.3	482	420	1850	0.3	404	358	1990	0.3	462	403
	17	1750	0.4	359	316	1870	0.4	413	360	1710	0.4	346	307	1820	0.4	396	346
12-# 7	21	1580	0.5	299	263	1680	0.5	344	300	1540	0.5	288	256	1630	0.5	330	288
4x-4y	25	1400	0.7	179	158	1470	0.7	206	180	1360	0.7	173	153	1420	0.7	198	173
	40	736	0.9	59	52	736	0.9	68	60	700	0.9	57	51	700	0.9	66	57
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		195	158	6.00	5.40	195	158	6.00	5.40	185	150	6.00	5.40	185	150	6.00	5.40
2.82 %	0	2210	0.0	648	520	2400	0.0	728	565	2170	0.0	629	508	2340	0.0	702	550
Ar(in²)	11	2030	0.2	583	468	2190	0.2	655	508	1990	0.2	566	457	2130	0.2	632	495
=10.16	13	1970	0.3	510	409	2110	0.3	573	445	1920	0.3	495	400	2060	0.3	553	433
	17	1810	0.4	437	351	1930	0.4	491	381	1770	0.4	424	343	1880	0.4	474	371
8-#10	21	1630	0.5	364	292	1720	0.5	409	318	1580	0.5	354	285	1670	0.5	395	309
4x-2y	25	1430	0.7	218	175	1500	0.7	245	190	1390	0.7	212	171	1450	0.7	237	185
	40	733	0.9	72	58	733	0.9	81	63	697	0.9	70	57	697	0.9	79	61
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		194	157	6.00	5.40	194	157	6.00	5.40	184	149	6.00	5.40	184	149	6.00	5.40
4.23 %	0	2370	0.0	759	663	2560	0.0	835	708	2330	0.0	739	652	2500	0.0	809	693
Ar(in²)	11	2170	0.2	683	596	2320	0.2	751	637	2120	0.2	665	587	2260	0.2	728	623
=15.24	13	2090	0.3	597	522	2230	0.3	657	557	2050	0.3	582	513	2180	0.3	637	545
	17	1910	0.4	512	447	2030	0.4	563	478	1870	0.4	499	440	1970	0.4	546	467
12-#10	21	1710	0.5	426	372	1790	0.5	469	398	1660	0.5	416	367	1740	0.5	455	389
4x-4y	25	1490	0.7	256	223	1550	0.7	281	239	1440	0.7	249	220	1490	0.7	273	233
	40	729	0.9	85	74	729	0.9	93	79	692	0.9	83	73	692	0.9	91	77
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		193	156	6.00	5.40	193	156	6.00	5.40	183	148	6.00	5.40	183	148	6.00	5.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 18 x 20

Designation		W 8 x 67								W 8 x 58							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.67 %	0	2070	0.0	441	397	2300	0.0	527	465	2000	0.0	410	370	2200	0.0	485	434
Ar(in^2)	11	1930	0.2	396	357	2130	0.2	474	418	1860	0.2	369	333	2030	0.2	436	391
= 2.40	13	1880	0.3	347	313	2070	0.3	415	366	1810	0.3	322	291	1970	0.3	382	342
	17	1760	0.4	297	268	1920	0.4	356	314	1680	0.4	276	250	1820	0.4	327	293
4-# 7	21	1610	0.5	248	223	1750	0.5	296	261	1540	0.5	230	208	1650	0.5	272	244
2x-2y	25	1450	0.7	148	134	1560	0.7	178	157	1380	0.7	138	125	1460	0.7	163	146
	40	840	0.9	49	44	842	0.9	59	52	774	0.9	46	41	774	0.9	54	48
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		223	180	6.00	5.40	223	180	6.00	5.40	205	166	6.00	5.40	205	166	6.00	5.40
1.11 %	0	2120	0.0	493	442	2350	0.0	579	509	2050	0.0	461	415	2250	0.0	536	479
Ar(in^2)	11	1970	0.2	443	398	2180	0.2	521	458	1900	0.2	415	373	2080	0.2	483	431
= 4.00	13	1920	0.3	388	348	2110	0.3	456	401	1850	0.3	363	327	2010	0.3	422	377
	17	1790	0.4	332	298	1950	0.4	391	344	1720	0.4	311	280	1860	0.4	362	323
4-# 9	21	1640	0.5	277	248	1770	0.5	325	286	1570	0.5	259	233	1680	0.5	301	269
2x-2y	25	1480	0.7	166	149	1580	0.7	195	172	1400	0.7	155	140	1480	0.7	181	161
	40	840	0.9	55	49	841	0.9	65	57	773	0.9	51	46	773	0.9	60	53
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		222	180	6.00	5.40	222	180	6.00	5.40	204	166	6.00	5.40	204	166	6.00	5.40
2.00 %	0	2220	0.0	579	505	2450	0.0	665	572	2150	0.0	548	478	2350	0.0	623	541
Ar(in^2)	11	2060	0.2	521	454	2260	0.2	599	515	1990	0.2	493	430	2160	0.2	560	487
= 7.20	13	2000	0.3	456	397	2190	0.3	524	450	1930	0.3	431	376	2090	0.3	490	426
	17	1860	0.4	391	340	2020	0.4	449	386	1790	0.4	370	323	1920	0.4	420	365
12-# 7	21	1700	0.5	325	284	1820	0.5	374	321	1620	0.5	308	269	1730	0.5	350	304
4x-4y	25	1520	0.7	195	170	1610	0.7	224	193	1440	0.7	185	161	1520	0.7	210	182
	40	838	0.9	65	56	838	0.9	74	64	770	0.9	61	53	770	0.9	70	60
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		222	179	6.00	5.40	222	179	6.00	5.40	204	165	6.00	5.40	204	165	6.00	5.40
2.82 %	0	2310	0.0	694	535	2550	0.0	780	586	2240	0.0	663	518	2450	0.0	738	562
Ar(in^2)	11	2140	0.2	624	482	2340	0.2	702	528	2070	0.2	597	466	2240	0.2	664	505
=10.16	13	2080	0.3	546	422	2260	0.3	614	462	2000	0.3	522	407	2160	0.3	581	442
	17	1920	0.4	468	361	2080	0.4	526	396	1850	0.4	447	349	1980	0.4	498	379
8-#10	21	1750	0.5	390	301	1870	0.5	439	330	1670	0.5	373	291	1770	0.5	415	316
4x-2y	25	1560	0.7	234	180	1650	0.7	263	198	1480	0.7	223	174	1550	0.7	249	189
	40	835	0.9	78	60	835	0.9	87	66	767	0.9	74	58	767	0.9	83	63
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		221	179	6.00	5.40	221	179	6.00	5.40	203	164	6.00	5.40	203	164	6.00	5.40
4.23 %	0	2470	0.0	793	678	2710	0.0	879	729	2400	0.0	762	660	2610	0.0	836	704
Ar(in^2)	11	2280	0.2	713	611	2470	0.2	791	656	2200	0.2	685	594	2370	0.2	752	634
=15.24	13	2200	0.3	624	534	2390	0.3	692	574	2130	0.3	600	520	2280	0.3	658	554
	17	2030	0.4	535	458	2180	0.4	593	492	1950	0.4	514	445	2080	0.4	564	475
12-#10	21	1830	0.5	446	381	1950	0.5	494	410	1750	0.5	428	371	1850	0.5	470	396
4x-4y	25	1610	0.7	267	229	1700	0.7	296	246	1530	0.7	257	222	1600	0.7	282	237
	40	830	0.9	89	76	830	0.9	98	82	763	0.9	85	74	763	0.9	94	79
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		220	178	6.00	5.40	220	178	6.00	5.40	202	163	6.00	5.40	202	163	6.00	5.40

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD ϕc = 0.85 f'c : 8.0 ksi NW

ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 18 x 18

Designation		W 14 x 53								W 14 x 48							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.74 %	0	1810	0.0	370	341	2000	0.0	477	398	1770	0.0	343	325	1940	0.0	439	379
Ar(in^2)	11	1690	0.2	333	307	1850	0.2	429	358	1650	0.2	309	292	1790	0.2	395	341
= 2.40	13	1640	0.3	292	268	1790	0.3	375	313	1600	0.3	270	256	1730	0.3	345	299
	17	1530	0.4	250	230	1650	0.4	322	268	1480	0.4	232	219	1600	0.4	296	256
4-# 7	21	1400	0.5	208	192	1500	0.5	268	223	1350	0.5	193	183	1440	0.5	247	213
2x-2y	25	1250	0.7	125	115	1330	0.7	161	134	1210	0.7	116	109	1280	0.7	148	128
	40	702	0.9	41	38	702	0.9	53	44	663	0.9	38	36	663	0.9	49	42
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		179	150	5.89	5.40	179	150	5.89	5.40	167	142	5.85	5.40	167	142	5.85	5.40
.98 %	0	1840	0.0	392	363	2020	0.0	499	419	1800	0.0	365	346	1960	0.0	461	401
Ar(in^2)	11	1710	0.2	353	326	1870	0.2	449	377	1670	0.2	329	312	1810	0.2	415	361
= 3.16	13	1660	0.3	309	285	1810	0.3	393	330	1620	0.3	288	273	1750	0.3	363	316
	17	1540	0.4	265	245	1670	0.4	336	282	1500	0.4	247	234	1610	0.4	311	270
4-# 8	21	1410	0.5	220	204	1510	0.5	280	235	1370	0.5	205	195	1460	0.5	259	225
2x-2y	25	1260	0.7	132	122	1340	0.7	168	141	1220	0.7	123	117	1280	0.7	155	135
	40	701	0.9	44	40	701	0.9	56	47	662	0.9	41	39	662	0.9	51	45
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		179	150	5.89	5.40	179	150	5.89	5.40	166	142	5.85	5.40	166	142	5.85	5.40
1.95 %	0	1940	0.0	482	455	2120	0.0	582	510	1900	0.0	456	439	2060	0.0	547	492
Ar(in^2)	11	1790	0.2	434	409	1950	0.2	524	459	1750	0.2	411	395	1890	0.2	492	443
= 6.32	13	1740	0.3	379	358	1890	0.3	458	402	1700	0.3	359	345	1830	0.3	431	388
	17	1610	0.4	325	307	1730	0.4	393	344	1570	0.4	308	296	1680	0.4	369	332
8-# 8	21	1460	0.5	271	255	1560	0.5	327	287	1420	0.5	256	246	1500	0.5	308	277
2x-4y	25	1300	0.7	162	153	1370	0.7	196	172	1260	0.7	154	148	1320	0.7	184	166
	40	699	0.9	54	51	699	0.9	65	57	659	0.9	51	49	659	0.9	61	55
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		178	150	5.89	5.40	178	150	5.89	5.40	166	141	5.85	5.40	166	141	5.85	5.40
2.78 %	0	2020	0.0	549	515	2210	0.0	654	570	1980	0.0	523	499	2150	0.0	617	552
Ar(in^2)	11	1860	0.2	494	463	2020	0.2	588	513	1820	0.2	470	449	1960	0.2	555	497
= 9.00	13	1810	0.3	432	405	1950	0.3	515	448	1760	0.3	412	393	1890	0.3	486	435
	17	1670	0.4	371	347	1790	0.4	441	384	1620	0.4	353	337	1730	0.4	416	373
4-#14	21	1510	0.5	309	289	1600	0.5	367	320	1460	0.5	294	280	1540	0.5	347	310
2x-2y	25	1330	0.7	185	173	1400	0.7	220	192	1290	0.7	176	168	1340	0.7	208	186
	40	696	0.9	61	57	696	0.9	73	64	657	0.9	58	56	657	0.9	69	62
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		177	149	5.89	5.40	177	149	5.89	5.40	165	141	5.85	5.40	165	141	5.85	5.40
3.85 %	0	2130	0.0	631	617	2320	0.0	724	671	2090	0.0	608	601	2260	0.0	691	653
Ar(in^2)	11	1960	0.2	568	555	2110	0.2	651	604	1910	0.2	547	541	2050	0.2	622	588
=12.48	13	1890	0.3	497	485	2030	0.3	570	528	1850	0.3	479	473	1980	0.3	544	514
	17	1740	0.4	426	416	1860	0.4	488	453	1690	0.4	410	405	1800	0.4	467	441
8-#11	21	1560	0.5	355	347	1650	0.5	407	377	1510	0.5	342	338	1590	0.5	389	367
2x-4y	25	1370	0.7	213	208	1430	0.7	244	226	1320	0.7	205	202	1380	0.7	233	220
	40	693	0.9	71	69	693	0.9	81	75	654	0.9	68	67	654	0.9	77	73
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		177	148	5.89	5.40	177	148	5.89	5.40	164	140	5.85	5.40	164	140	5.85	5.40

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 18 x 18

Designation		W 10 x 68								W 10 x 60							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.74 %	0	1930	0.0	403	393	2170	0.0	503	466	1860	0.0	371	368	2070	0.0	459	436
Ar(in²)	11	1810	0.2	362	354	2010	0.2	453	419	1740	0.2	334	331	1920	0.2	413	393
= 2.40	13	1760	0.3	317	310	1950	0.3	396	367	1690	0.3	292	289	1860	0.3	361	344
	17	1650	0.4	272	265	1820	0.4	340	314	1580	0.4	250	248	1730	0.4	310	294
4-# 7	21	1520	0.5	226	221	1660	0.5	283	262	1450	0.5	208	207	1570	0.5	258	245
2x-2y	25	1370	0.7	136	132	1480	0.7	170	157	1310	0.7	125	124	1400	0.7	155	147
	40	811	0.9	45	44	817	0.9	56	52	753	0.9	41	41	754	0.9	51	49
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		175	175	5.40	5.40	175	175	5.40	5.40	162	162	5.40	5.40	162	162	5.40	5.40
.98 %	0	1950	0.0	424	414	2190	0.0	525	487	1890	0.0	392	389	2100	0.0	481	458
Ar(in²)	11	1830	0.2	382	373	2030	0.2	472	438	1760	0.2	353	350	1940	0.2	433	412
= 3.16	13	1780	0.3	334	326	1970	0.3	413	383	1710	0.3	309	306	1880	0.3	378	360
	17	1670	0.4	286	280	1830	0.4	354	329	1600	0.4	265	263	1740	0.4	324	309
4-# 8	21	1530	0.5	239	233	1670	0.5	295	274	1470	0.5	221	219	1580	0.5	270	257
2x-2y	25	1390	0.7	143	140	1490	0.7	177	164	1320	0.7	132	131	1410	0.7	162	154
	40	811	0.9	47	46	816	0.9	59	54	753	0.9	44	43	754	0.9	54	51
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		175	175	5.40	5.40	175	175	5.40	5.40	161	161	5.40	5.40	161	161	5.40	5.40
1.95 %	0	2050	0.0	492	506	2290	0.0	592	578	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	1910	0.2	442	456	2120	0.2	533	520	0	0.2	0	0	0	0.2	0	0
= 6.32	13	1860	0.3	387	399	2050	0.3	466	455	0	0.3	0	0	0	0.3	0	0
	17	1740	0.4	332	342	1900	0.4	400	390	0	0.4	0	0	0	0.4	0	0
8-# 8	21	1590	0.5	276	285	1720	0.5	333	325	0	0.5	0	0	0	0.5	0	0
2x-4y	25	1430	0.7	166	171	1530	0.7	200	195	0	0.7	0	0	0	0.7	0	0
	40	813	0.9	55	57	813	0.9	66	65	0	0.9	0	0	0	0.9	0	0
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		174	174	5.40	5.40	174	174	5.40	5.40	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 18 x 18

Designation		W 10 x 54								W 10 x 49							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.74 %	0	1820	0.0	346	347	2000	0.0	425	412	1780	0.0	327	330	1950	0.0	399	392
Ar(in^2)	11	1690	0.2	311	312	1850	0.2	383	371	1650	0.2	294	297	1800	0.2	359	353
= 2.40	13	1640	0.3	272	273	1800	0.3	335	324	1610	0.3	258	260	1740	0.3	314	309
	17	1530	0.4	233	234	1660	0.4	287	278	1490	0.4	221	222	1610	0.4	269	264
4-# 7	21	1400	0.5	194	195	1510	0.5	239	232	1360	0.5	184	185	1450	0.5	224	220
2x-2y	25	1260	0.7	116	117	1340	0.7	143	139	1220	0.7	110	111	1290	0.7	134	132
	40	707	0.9	38	39	707	0.9	47	46	671	0.9	36	37	671	0.9	44	44
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		151	151	5.40	5.40	151	151	5.40	5.40	144	144	5.40	5.40	144	144	5.40	5.40
.98 %	0	1840	0.0	368	368	2030	0.0	447	434	1800	0.0	349	351	1980	0.0	421	414
Ar(in^2)	11	1710	0.2	331	331	1870	0.2	402	390	1670	0.2	314	316	1820	0.2	379	372
= 3.16	13	1660	0.3	290	290	1820	0.3	352	341	1630	0.3	275	276	1760	0.3	331	326
	17	1550	0.4	248	248	1680	0.4	301	293	1510	0.4	235	237	1620	0.4	284	279
4-# 8	21	1410	0.5	207	207	1520	0.5	251	244	1370	0.5	196	197	1470	0.5	236	233
2x-2y	25	1270	0.7	124	124	1340	0.7	150	146	1230	0.7	117	118	1290	0.7	142	139
	40	707	0.9	41	41	707	0.9	50	48	670	0.9	39	39	670	0.9	47	46
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		151	151	5.40	5.40	151	151	5.40	5.40	143	143	5.40	5.40	143	143	5.40	5.40
1.95 %	0	1940	0.0	461	418	2130	0.0	540	478	1900	0.0	442	405	2080	0.0	513	458
Ar(in^2)	11	1800	0.2	414	376	1960	0.2	486	430	1760	0.2	397	364	1900	0.2	462	412
= 6.32	13	1740	0.3	363	329	1890	0.3	425	376	1700	0.3	348	319	1840	0.3	404	361
	17	1620	0.4	311	282	1740	0.4	364	323	1580	0.4	298	273	1690	0.4	346	309
8-# 8	21	1470	0.5	259	235	1570	0.5	303	269	1430	0.5	248	227	1520	0.5	289	258
4x-2y	25	1310	0.7	155	141	1380	0.7	182	161	1260	0.7	149	136	1330	0.7	173	154
	40	704	0.9	51	47	704	0.9	60	53	667	0.9	49	45	667	0.9	57	51
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		151	151	5.40	5.40	151	151	5.40	5.40	143	143	5.40	5.40	143	143	5.40	5.40
2.93 %	0	2040	0.0	528	509	2230	0.0	606	569	2000	0.0	509	496	2170	0.0	579	550
Ar(in^2)	11	1880	0.2	475	458	2040	0.2	545	512	1840	0.2	458	447	1990	0.2	521	495
= 9.48	13	1820	0.3	416	401	1970	0.3	477	448	1780	0.3	401	391	1920	0.3	456	433
	17	1680	0.4	356	344	1810	0.4	409	384	1640	0.4	344	335	1750	0.4	391	371
12-# 8	21	1520	0.5	297	286	1620	0.5	341	320	1480	0.5	286	279	1560	0.5	326	309
4x-4y	25	1340	0.7	178	172	1410	0.7	204	192	1300	0.7	172	167	1360	0.7	195	185
	40	701	0.9	59	57	701	0.9	68	64	664	0.9	57	55	664	0.9	65	61
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		150	150	5.40	5.40	150	150	5.40	5.40	142	142	5.40	5.40	142	142	5.40	5.40
3.85 %	0	2140	0.0	586	623	2320	0.0	661	686	2100	0.0	568	607	2270	0.0	637	667
Ar(in^2)	11	1960	0.2	528	561	2120	0.2	595	618	1920	0.2	511	546	2060	0.2	573	600
=12.48	13	1900	0.3	462	491	2040	0.3	520	540	1860	0.3	447	478	1990	0.3	501	525
	17	1740	0.4	396	420	1860	0.4	446	463	1700	0.4	383	409	1810	0.4	430	450
8-#11	21	1570	0.5	330	350	1660	0.5	371	386	1520	0.5	319	341	1600	0.5	358	375
2x-4y	25	1380	0.7	198	210	1440	0.7	223	231	1330	0.7	191	204	1390	0.7	215	225
	40	698	0.9	66	70	698	0.9	74	77	662	0.9	63	68	662	0.9	71	75
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		149	149	5.40	5.40	149	149	5.40	5.40	142	142	5.40	5.40	142	142	5.40	5.40

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 18 x 18

Designation		W 10 x 45								W							
Fy (ksi)		36				50											
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy								
.74 %	0	1750	0.0	312	315	1910	0.0	379	369								
Ar(in²)	11	1620	0.2	281	284	1760	0.2	341	332								
= 2.40	13	1580	0.3	246	248	1700	0.3	298	291								
	17	1460	0.4	210	213	1570	0.4	256	249								
4-# 7	21	1330	0.5	175	177	1410	0.5	213	207								
2x-2y	25	1180	0.7	105	106	1250	0.7	128	124								
	40	642	0.9	35	35	642	0.9	42	41								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		137	137	5.40	5.40	137	137	5.40	5.40								
.98 %	0	1770	0.0	334	337	1930	0.0	401	390								
Ar(in²)	11	1640	0.2	300	303	1780	0.2	360	351								
= 3.16	13	1590	0.3	263	265	1720	0.3	315	307								
	17	1480	0.4	225	227	1580	0.4	270	263								
4-# 8	21	1340	0.5	188	189	1430	0.5	225	219								
2x-2y	25	1190	0.7	112	113	1260	0.7	135	131								
	40	641	0.9	37	37	641	0.9	45	43								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		137	137	5.40	5.40	137	137	5.40	5.40								
1.95 %	0	1870	0.0	427	387	2030	0.0	493	435								
Ar(in²)	11	1730	0.2	384	348	1860	0.2	444	391								
= 6.32	13	1670	0.3	336	305	1800	0.3	388	342								
	17	1540	0.4	288	261	1650	0.4	333	293								
8-# 8	21	1390	0.5	240	218	1470	0.5	277	244								
4x-2y	25	1230	0.7	144	130	1290	0.7	166	146								
	40	639	0.9	48	43	639	0.9	55	48								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		137	137	5.40	5.40	137	137	5.40	5.40								
2.93 %	0	1970	0.0	495	479	2130	0.0	560	527								
Ar(in²)	11	1810	0.2	446	431	1940	0.2	504	474								
= 9.48	13	1750	0.3	390	377	1870	0.3	441	415								
	17	1610	0.4	334	323	1710	0.4	378	355								
12-# 8	21	1440	0.5	278	269	1520	0.5	315	296								
4x-4y	25	1270	0.7	167	161	1320	0.7	189	177								
	40	636	0.9	55	53	636	0.9	63	59								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		136	136	5.40	5.40	136	136	5.40	5.40								
3.85 %	0	2070	0.0	554	592	2230	0.0	616	643								
Ar(in²)	11	1890	0.2	498	533	2020	0.2	555	579								
=12.48	13	1820	0.3	436	466	1940	0.3	485	506								
	17	1670	0.4	374	399	1760	0.4	416	434								
8-#11	21	1490	0.5	311	333	1560	0.5	346	362								
2x-4y	25	1300	0.7	187	199	1350	0.7	208	217								
	40	633	0.9	62	66	633	0.9	69	72								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		135	135	5.40	5.40	135	135	5.40	5.40								

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 8.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 18 x 18

Designation		W 8 x 67								W 8 x 58							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.74 %	0	1920	0.0	388	383	2150	0.0	473	446	1850	0.0	357	358	2050	0.0	430	417
Ar(in²)	11	1800	0.2	349	345	2000	0.2	425	402	1730	0.2	321	322	1900	0.2	387	376
= 2.40	13	1750	0.3	305	302	1940	0.3	372	351	1680	0.3	281	282	1850	0.3	339	329
	17	1640	0.4	261	258	1810	0.4	319	301	1570	0.4	241	241	1710	0.4	290	282
4-# 7	21	1510	0.5	218	215	1650	0.5	266	251	1440	0.5	201	201	1550	0.5	242	235
2x-2y	25	1370	0.7	130	129	1470	0.7	159	150	1290	0.7	120	120	1380	0.7	145	141
	40	804	0.9	43	43	809	0.9	53	50	740	0.9	40	40	741	0.9	48	47
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		173	173	5.40	5.40	173	173	5.40	5.40	159	159	5.40	5.40	159	159	5.40	5.40
.98 %	0	1940	0.0	409	405	2180	0.0	494	468	1880	0.0	379	379	2080	0.0	452	439
Ar(in²)	11	1820	0.2	368	364	2020	0.2	445	421	1750	0.2	341	341	1920	0.2	407	395
= 3.16	13	1770	0.3	322	318	1960	0.3	389	368	1700	0.3	298	299	1860	0.3	356	346
	17	1660	0.4	276	273	1820	0.4	333	316	1590	0.4	255	256	1730	0.4	305	296
4-# 8	21	1520	0.5	230	227	1660	0.5	278	263	1450	0.5	213	213	1570	0.5	254	247
2x-2y	25	1380	0.7	138	136	1480	0.7	166	158	1300	0.7	127	128	1390	0.7	152	148
	40	804	0.9	46	45	808	0.9	55	52	740	0.9	42	42	741	0.9	50	49
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		173	173	5.40	5.40	173	173	5.40	5.40	159	159	5.40	5.40	159	159	5.40	5.40
1.95 %	0	2040	0.0	502	449	2280	0.0	586	512	1980	0.0	471	424	2180	0.0	544	483
Ar(in²)	11	1910	0.2	451	404	2110	0.2	527	461	1830	0.2	424	381	2010	0.2	489	435
= 6.32	13	1850	0.3	395	353	2040	0.3	461	403	1780	0.3	371	334	1940	0.3	428	381
	17	1730	0.4	338	303	1890	0.4	395	346	1650	0.4	318	286	1790	0.4	367	326
8-# 8	21	1580	0.5	282	252	1710	0.5	329	288	1510	0.5	265	238	1620	0.5	306	272
4x-2y	25	1420	0.7	169	151	1520	0.7	197	173	1350	0.7	159	143	1430	0.7	183	163
	40	805	0.9	56	50	806	0.9	65	57	738	0.9	53	47	738	0.9	61	54
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		173	173	5.40	5.40	173	173	5.40	5.40	158	158	5.40	5.40	158	158	5.40	5.40
2.93 %	0	2140	0.0	560	541	2380	0.0	645	603	2080	0.0	529	516	2280	0.0	602	574
Ar(in²)	11	1990	0.2	504	486	2190	0.2	580	543	1920	0.2	476	464	2090	0.2	542	517
= 9.48	13	1930	0.3	441	426	2120	0.3	508	475	1860	0.3	417	406	2020	0.3	474	452
	17	1800	0.4	378	365	1950	0.4	435	407	1720	0.4	357	348	1860	0.4	406	388
12-# 8	21	1640	0.5	315	304	1760	0.5	362	339	1560	0.5	298	290	1670	0.5	339	323
4x-4y	25	1460	0.7	189	182	1560	0.7	217	203	1380	0.7	178	174	1460	0.7	203	194
	40	803	0.9	63	60	803	0.9	72	67	735	0.9	59	58	735	0.9	67	64
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		172	172	5.40	5.40	172	172	5.40	5.40	157	157	5.40	5.40	157	157	5.40	5.40
3.85 %	0	2240	0.0	664	563	2470	0.0	748	625	2170	0.0	633	539	2370	0.0	706	597
Ar(in²)	11	2070	0.2	597	507	2270	0.2	673	563	2000	0.2	570	485	2170	0.2	635	537
=12.48	13	2010	0.3	523	443	2190	0.3	589	492	1930	0.3	498	425	2090	0.3	556	470
	17	1860	0.4	448	380	2020	0.4	505	422	1780	0.4	427	364	1910	0.4	476	403
8-#11	21	1690	0.5	373	316	1810	0.5	421	352	1610	0.5	356	303	1710	0.5	397	335
4x-2y	25	1500	0.7	224	190	1590	0.7	252	211	1420	0.7	213	182	1490	0.7	238	201
	40	800	0.9	74	63	800	0.9	84	70	732	0.9	71	60	732	0.9	79	67
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		171	171	5.40	5.40	171	171	5.40	5.40	157	157	5.40	5.40	157	157	5.40	5.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 8.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 18 x 18

Designation		W 8 x 48								W							
Fy (ksi)		36				50											
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy								
.74 %	0	1770	0.0	322	326	1940	0.0	383	381								
Ar(in²)	11	1650	0.2	290	293	1790	0.2	345	343								
= 2.40	13	1600	0.3	254	256	1730	0.3	301	300								
	17	1480	0.4	217	220	1600	0.4	258	257								
4-# 7	21	1350	0.5	181	183	1440	0.5	215	214								
2x-2y	25	1210	0.7	108	110	1280	0.7	129	128								
	40	663	0.9	36	36	663	0.9	43	42								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		142	142	5.40	5.40	142	142	5.40	5.40								
.98 %	0	1800	0.0	344	347	1960	0.0	404	402								
Ar(in²)	11	1670	0.2	309	313	1810	0.2	364	362								
= 3.16	13	1620	0.3	271	273	1750	0.3	318	317								
	17	1500	0.4	232	234	1610	0.4	273	271								
4-# 8	21	1370	0.5	193	195	1460	0.5	227	226								
2x-2y	25	1220	0.7	116	117	1280	0.7	136	135								
	40	662	0.9	38	39	662	0.9	45	45								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		142	142	5.40	5.40	142	142	5.40	5.40								
1.95 %	0	1900	0.0	436	395	2060	0.0	497	447								
Ar(in²)	11	1750	0.2	393	356	1890	0.2	447	402								
= 6.32	13	1700	0.3	343	311	1830	0.3	391	352								
	17	1570	0.4	294	267	1680	0.4	335	301								
8-# 8	21	1420	0.5	245	222	1500	0.5	279	251								
4x-2y	25	1260	0.7	147	133	1320	0.7	167	150								
	40	659	0.9	49	44	659	0.9	55	50								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		141	141	5.40	5.40	141	141	5.40	5.40								
2.93 %	0	2000	0.0	495	487	2160	0.0	555	539								
Ar(in²)	11	1830	0.2	445	438	1970	0.2	500	485								
= 9.48	13	1770	0.3	390	383	1900	0.3	437	424								
	17	1630	0.4	334	328	1740	0.4	375	363								
12-# 8	21	1470	0.5	278	274	1550	0.5	312	303								
4x-4y	25	1290	0.7	167	164	1350	0.7	187	181								
	40	657	0.9	55	54	657	0.9	62	60								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		141	141	5.40	5.40	141	141	5.40	5.40								
3.85 %	0	2090	0.0	599	516	2260	0.0	659	561								
Ar(in²)	11	1910	0.2	539	464	2050	0.2	593	505								
=12.48	13	1850	0.3	471	406	1980	0.3	519	442								
	17	1690	0.4	404	348	1800	0.4	444	378								
8-#11	21	1510	0.5	337	290	1590	0.5	370	315								
4x-2y	25	1320	0.7	202	174	1380	0.7	222	189								
	40	654	0.9	67	58	654	0.9	74	63								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		140	140	5.40	5.40	140	140	5.40	5.40								

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 36 x 36

Designation		W 14 x426								W 14 x398							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.48 %	0	5830	0.0	3420	2590	7320	0.0	4390	3060	5600	0.0	3220	2500	6990	0.0	4130	2940
Ar(in²)	11	5770	0.2	3070	2330	7230	0.2	3960	2750	5540	0.2	2900	2250	6900	0.2	3720	2650
= 6.24	13	5750	0.3	2690	2040	7190	0.3	3460	2410	5520	0.3	2540	1970	6870	0.3	3250	2310
	17	5690	0.4	2310	1750	7100	0.4	2970	2070	5460	0.4	2180	1690	6780	0.4	2790	1980
4-#11	21	5620	0.5	1920	1460	6990	0.5	2470	1720	5390	0.5	1810	1410	6670	0.5	2320	1650
2x-2y	25	5540	0.7	1150	873	6860	0.7	1480	1030	5310	0.7	1090	843	6550	0.7	1390	991
	40	5110	0.9	384	291	6190	0.9	494	344	4890	0.9	362	281	5910	0.9	464	330
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3460	3460	10.80	10.80	3460	3460	10.80	10.80	3280	3280	10.80	10.80	3280	3280	10.80	10.80
.96 %	0	6040	0.0	3840	2910	7530	0.0	4820	3380	5810	0.0	3650	2820	7200	0.0	4560	3260
Ar(in²)	11	5980	0.2	3460	2620	7430	0.2	4340	3050	5750	0.2	3280	2540	7110	0.2	4100	2940
=12.48	13	5960	0.3	3020	2290	7400	0.3	3790	2660	5730	0.3	2870	2220	7070	0.3	3590	2570
	17	5890	0.4	2590	1970	7300	0.4	3250	2280	5670	0.4	2460	1910	6980	0.4	3080	2200
8-#11	21	5820	0.5	2160	1640	7180	0.5	2710	1900	5590	0.5	2050	1590	6870	0.5	2560	1840
4x-2y	25	5730	0.7	1300	983	7040	0.7	1630	1140	5500	0.7	1230	953	6730	0.7	1540	1100
	40	5270	0.9	432	327	6340	0.9	542	380	5050	0.9	410	317	6060	0.9	512	367
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3460	3460	10.80	10.80	3460	3460	10.80	10.80	3280	3280	10.80	10.80	3280	3280	10.80	10.80
1.96 %	0	6480	0.0	4500	3600	7970	0.0	5470	4080	6250	0.0	4310	3520	7640	0.0	5210	3950
Ar(in²)	11	6410	0.2	4050	3240	7860	0.2	4930	3670	6180	0.2	3880	3160	7540	0.2	4690	3560
=25.40	13	6380	0.3	3540	2840	7820	0.3	4310	3210	6150	0.3	3390	2770	7500	0.3	4110	3110
	17	6310	0.4	3040	2430	7710	0.4	3700	2750	6080	0.4	2910	2370	7390	0.4	3520	2670
20-#10	21	6230	0.5	2530	2030	7580	0.5	3080	2290	6000	0.5	2420	1980	7270	0.5	2930	2220
6x-6y	25	6120	0.7	1520	1220	7430	0.7	1850	1380	5890	0.7	1450	1190	7110	0.7	1760	1330
	40	5590	0.9	506	405	6650	0.9	615	458	5380	0.9	484	395	6360	0.9	586	444
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		3450	3450	10.80	10.80	3450	3450	10.80	10.80	3270	3270	10.80	10.80	3270	3270	10.80	10.80
2.89 %	0	6900	0.0	5250	4110	8380	0.0	6220	4580	6660	0.0	5050	4020	8060	0.0	5960	4460
Ar(in²)	11	6810	0.2	4720	3700	8260	0.2	5600	4120	6580	0.2	4550	3620	7940	0.2	5360	4020
=37.44	13	6780	0.3	4130	3240	8220	0.3	4900	3610	6550	0.3	3980	3170	7890	0.3	4690	3510
	17	6700	0.4	3540	2780	8100	0.4	4200	3090	6470	0.4	3410	2720	7780	0.4	4020	3010
24-#11	21	6600	0.5	2950	2310	7950	0.5	3500	2580	6370	0.5	2840	2260	7640	0.5	3350	2510
8x-6y	25	6480	0.7	1770	1390	7780	0.7	2100	1550	6260	0.7	1710	1360	7470	0.7	2010	1510
	40	5890	0.9	590	462	6920	0.9	699	515	5670	0.9	568	452	6630	0.9	670	501
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3450	3450	10.80	10.80	3450	3450	10.80	10.80	3260	3260	10.80	10.80	3260	3260	10.80	10.80
3.70 %	0	7260	0.0	5770	4920	8740	0.0	6740	5390	7020	0.0	5580	4830	8420	0.0	6480	5270
Ar(in²)	11	7170	0.2	5190	4430	8610	0.2	6070	4850	6930	0.2	5020	4350	8290	0.2	5830	4740
=48.00	13	7130	0.3	4540	3870	8560	0.3	5310	4240	6900	0.3	4390	3800	8240	0.3	5100	4150
	17	7040	0.4	3890	3320	8430	0.4	4550	3640	6810	0.4	3760	3260	8110	0.4	4370	3560
12-#18	21	6930	0.5	3240	2770	8270	0.5	3790	3030	6700	0.5	3140	2720	7960	0.5	3650	2960
4x-4y	25	6800	0.7	1950	1660	8090	0.7	2280	1820	6570	0.7	1880	1630	7770	0.7	2190	1780
	40	6150	0.9	648	553	7160	0.9	758	606	5930	0.9	627	543	6870	0.9	729	592
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3440	3440	10.80	10.80	3440	3440	10.80	10.80	3260	3260	10.80	10.80	3260	3260	10.80	10.80

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 36 x 36

Designation		W 14 x370								W 14 x342							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.48 %	0	5360	0.0	3040	2410	6660	0.0	3880	2820	5130	0.0	2850	2320	6330	0.0	3620	2700
Ar(in²)	11	5310	0.2	2730	2170	6580	0.2	3490	2540	5080	0.2	2570	2090	6250	0.2	3260	2430
= 6.24	13	5290	0.3	2390	1900	6540	0.3	3050	2220	5060	0.3	2250	1830	6220	0.3	2850	2130
	17	5230	0.4	2050	1630	6460	0.4	2620	1900	5010	0.4	1930	1570	6140	0.4	2450	1830
4-#11	21	5170	0.5	1710	1360	6360	0.5	2180	1590	4940	0.5	1600	1310	6040	0.5	2040	1520
2x-2y	25	5090	0.7	1030	813	6240	0.7	1310	952	4860	0.7	962	783	5920	0.7	1220	912
	40	4680	0.9	341	271	5620	0.9	436	317	4470	0.9	320	261	5340	0.9	407	304
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3100	3100	10.80	10.80	3100	3100	10.80	10.80	2920	2920	10.80	10.80	2920	2920	10.80	10.80
.96 %	0	5580	0.0	3460	2740	6880	0.0	4300	3150	5350	0.0	3280	2640	6550	0.0	4050	3030
Ar(in²)	11	5520	0.2	3120	2460	6780	0.2	3870	2830	5290	0.2	2950	2380	6460	0.2	3640	2730
=12.48	13	5490	0.3	2730	2150	6750	0.3	3390	2480	5260	0.3	2580	2080	6430	0.3	3190	2380
	17	5440	0.4	2340	1850	6660	0.4	2900	2120	5210	0.4	2210	1790	6340	0.4	2730	2040
8-#11	21	5360	0.5	1950	1540	6550	0.5	2420	1770	5140	0.5	1840	1490	6240	0.5	2280	1700
4x-2y	25	5280	0.7	1170	923	6420	0.7	1450	1060	5050	0.7	1110	892	6110	0.7	1370	1020
	40	4840	0.9	389	307	5770	0.9	483	353	4630	0.9	368	297	5480	0.9	455	340
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3090	3090	10.80	10.80	3090	3090	10.80	10.80	2910	2910	10.80	10.80	2910	2910	10.80	10.80
1.96 %	0	6020	0.0	4120	3430	7320	0.0	4960	3840	5790	0.0	3940	3340	6990	0.0	4710	3720
Ar(in²)	11	5950	0.2	3710	3090	7210	0.2	4460	3450	5720	0.2	3540	3000	6890	0.2	4230	3350
=25.40	13	5920	0.3	3250	2700	7170	0.3	3910	3020	5690	0.3	3100	2630	6850	0.3	3710	2930
	17	5850	0.4	2780	2310	7070	0.4	3350	2590	5630	0.4	2660	2250	6750	0.4	3180	2510
20-#10	21	5770	0.5	2320	1930	6950	0.5	2790	2160	5540	0.5	2210	1880	6630	0.5	2650	2090
6x-6y	25	5670	0.7	1390	1160	6800	0.7	1670	1290	5440	0.7	1330	1130	6490	0.7	1590	1260
	40	5160	0.9	463	385	6070	0.9	557	431	4950	0.9	442	375	5780	0.9	529	418
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		3090	3090	10.80	10.80	3090	3090	10.80	10.80	2910	2910	10.80	10.80	2910	2910	10.80	10.80
2.89 %	0	6430	0.0	4870	3940	7730	0.0	5710	4340	6200	0.0	4680	3850	7400	0.0	5450	4230
Ar(in²)	11	6350	0.2	4380	3540	7610	0.2	5140	3910	6120	0.2	4210	3460	7290	0.2	4910	3800
=37.44	13	6320	0.3	3830	3100	7570	0.3	4490	3420	6090	0.3	3690	3030	7240	0.3	4290	3330
	17	6240	0.4	3290	2660	7460	0.4	3850	2930	6010	0.4	3160	2600	7140	0.4	3680	2850
24-#11	21	6150	0.5	2740	2210	7320	0.5	3210	2440	5920	0.5	2630	2160	7000	0.5	3070	2380
8x-6y	25	6030	0.7	1640	1330	7150	0.7	1930	1470	5800	0.7	1580	1300	6840	0.7	1840	1430
	40	5460	0.9	547	442	6340	0.9	641	488	5240	0.9	526	432	6050	0.9	613	475
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3080	3080	10.80	10.80	3080	3080	10.80	10.80	2900	2900	10.80	10.80	2900	2900	10.80	10.80
3.70 %	0	6790	0.0	5390	4740	8090	0.0	6230	5150	6560	0.0	5200	4650	7760	0.0	5970	5030
Ar(in²)	11	6700	0.2	4850	4270	7960	0.2	5600	4640	6470	0.2	4680	4190	7640	0.2	5380	4530
=48.00	13	6670	0.3	4240	3740	7910	0.3	4900	4060	6440	0.3	4100	3660	7590	0.3	4700	3960
	17	6580	0.4	3640	3200	7790	0.4	4200	3480	6350	0.4	3510	3140	7470	0.4	4030	3400
12-#18	21	6470	0.5	3030	2670	7640	0.5	3500	2900	6240	0.5	2930	2620	7320	0.5	3360	2830
4x-4y	25	6350	0.7	1820	1600	7460	0.7	2100	1740	6120	0.7	1760	1570	7150	0.7	2020	1700
	40	5710	0.9	606	533	6580	0.9	700	579	5490	0.9	585	523	6280	0.9	672	566
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		3080	3080	10.80	10.80	3080	3080	10.80	10.80	2900	2900	10.80	10.80	2900	2900	10.80	10.80

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 36 x 36

Designation		W 14 x311								W 14 x283							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.48 %	0	4850	0.0	2650	2220	5940	0.0	3350	2580	4620	0.0	2480	2130	5610	0.0	3100	2460
Ar(in²)	11	4800	0.2	2390	2000	5860	0.2	3010	2320	4570	0.2	2230	1920	5530	0.2	2790	2210
= 6.24	13	4780	0.3	2090	1750	5830	0.3	2630	2030	4550	0.3	1950	1680	5510	0.3	2440	1940
	17	4730	0.4	1790	1500	5760	0.4	2260	1740	4500	0.4	1670	1440	5430	0.4	2090	1660
4-#11	21	4670	0.5	1490	1250	5660	0.5	1880	1450	4440	0.5	1390	1200	5340	0.5	1740	1380
2x-2y	25	4590	0.7	895	749	5550	0.7	1130	869	4360	0.7	835	718	5240	0.7	1050	829
	40	4210	0.9	298	249	4990	0.9	376	289	4000	0.9	278	239	4700	0.9	348	276
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2700	2700	10.80	10.80	2700	2700	10.80	10.80	2510	2510	10.80	10.80	2510	2510	10.80	10.80
.96 %	0	5070	0.0	3080	2540	6150	0.0	3770	2900	4830	0.0	2900	2450	5820	0.0	3530	2780
Ar(in²)	11	5010	0.2	2770	2290	6070	0.2	3390	2610	4780	0.2	2610	2210	5740	0.2	3170	2500
=12.48	13	4990	0.3	2420	2000	6040	0.3	2970	2280	4750	0.3	2280	1930	5710	0.3	2780	2190
	17	4930	0.4	2080	1720	5960	0.4	2540	1960	4700	0.4	1960	1660	5630	0.4	2380	1880
8-#11	21	4860	0.5	1730	1430	5860	0.5	2120	1630	4630	0.5	1630	1380	5540	0.5	1980	1570
4x-2y	25	4780	0.7	1040	858	5740	0.7	1270	978	4550	0.7	978	827	5420	0.7	1190	939
	40	4370	0.9	346	286	5140	0.9	424	326	4150	0.9	326	275	4850	0.9	396	313
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2700	2700	10.80	10.80	2700	2700	10.80	10.80	2510	2510	10.80	10.80	2510	2510	10.80	10.80
1.96 %	0	5510	0.0	3740	3240	6600	0.0	4430	3590	5270	0.0	3560	3150	6260	0.0	4180	3480
Ar(in²)	11	5440	0.2	3360	2910	6500	0.2	3990	3230	5210	0.2	3200	2830	6170	0.2	3770	3130
=25.40	13	5410	0.3	2940	2550	6460	0.3	3490	2830	5180	0.3	2800	2480	6130	0.3	3300	2740
	17	5350	0.4	2520	2190	6370	0.4	2990	2420	5120	0.4	2400	2120	6040	0.4	2820	2350
20-#10	21	5270	0.5	2100	1820	6250	0.5	2490	2020	5040	0.5	2000	1770	5930	0.5	2350	1960
6x-6y	25	5170	0.7	1260	1090	6120	0.7	1490	1210	4940	0.7	1200	1060	5800	0.7	1410	1170
	40	4690	0.9	420	364	5440	0.9	498	404	4470	0.9	400	353	5140	0.9	470	391
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2690	2690	10.80	10.80	2690	2690	10.80	10.80	2510	2510	10.80	10.80	2510	2510	10.80	10.80
2.89 %	0	5920	0.0	4480	3750	7010	0.0	5180	4100	5680	0.0	4310	3660	6680	0.0	4930	3980
Ar(in²)	11	5840	0.2	4030	3370	6900	0.2	4660	3690	5610	0.2	3880	3290	6570	0.2	4440	3590
=37.44	13	5810	0.3	3530	2950	6860	0.3	4080	3230	5580	0.3	3390	2880	6530	0.3	3880	3140
	17	5740	0.4	3030	2530	6750	0.4	3490	2770	5500	0.4	2910	2470	6430	0.4	3330	2690
24-#11	21	5640	0.5	2520	2110	6620	0.5	2910	2310	5410	0.5	2420	2060	6300	0.5	2770	2240
8x-6y	25	5530	0.7	1510	1260	6470	0.7	1750	1380	5300	0.7	1450	1230	6150	0.7	1660	1340
	40	4970	0.9	504	421	5700	0.9	582	461	4750	0.9	484	411	5410	0.9	554	448
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2680	2680	10.80	10.80	2680	2680	10.80	10.80	2500	2500	10.80	10.80	2500	2500	10.80	10.80
3.70 %	0	6280	0.0	5000	4550	7370	0.0	5700	4910	6040	0.0	4830	4460	7040	0.0	5450	4790
Ar(in²)	11	6190	0.2	4500	4100	7250	0.2	5130	4420	5960	0.2	4350	4020	6920	0.2	4910	4310
=48.00	13	6160	0.3	3940	3590	7200	0.3	4490	3860	5920	0.3	3800	3510	6870	0.3	4290	3770
	17	6070	0.4	3380	3070	7080	0.4	3850	3310	5840	0.4	3260	3010	6760	0.4	3680	3230
12-#18	21	5970	0.5	2820	2560	6940	0.5	3200	2760	5730	0.5	2720	2510	6620	0.5	3070	2690
4x-4y	25	5840	0.7	1690	1540	6770	0.7	1920	1660	5610	0.7	1630	1510	6450	0.7	1840	1620
	40	5220	0.9	563	512	5930	0.9	640	551	4990	0.9	543	502	5630	0.9	613	538
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2680	2680	10.80	10.80	2680	2680	10.80	10.80	2490	2490	10.80	10.80	2490	2490	10.80	10.80

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 36 x 36

Designation		W 14 x257								W 14 x233							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.48 %	0	4390	0.0	2310	2040	5290	0.0	2880	2350	4190	0.0	2160	1950	5000	0.0	2670	2240
Ar(in²)	11	4340	0.2	2080	1840	5220	0.2	2590	2110	4140	0.2	1950	1760	4930	0.2	2400	2020
= 6.24	13	4330	0.3	1820	1610	5190	0.3	2260	1850	4120	0.3	1700	1540	4910	0.3	2100	1770
	17	4280	0.4	1560	1380	5130	0.4	1940	1580	4070	0.4	1460	1320	4840	0.4	1800	1510
4-#11	21	4220	0.5	1300	1150	5040	0.5	1620	1320	4020	0.5	1220	1100	4760	0.5	1500	1260
2x-2y	25	4150	0.7	780	688	4940	0.7	970	792	3950	0.7	729	659	4660	0.7	900	756
	40	3790	0.9	260	229	4430	0.9	323	264	3600	0.9	243	219	4170	0.9	300	252
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2340	2340	10.80	10.80	2340	2340	10.80	10.80	2180	2180	10.80	10.80	2180	2180	10.80	10.80
.96 %	0	4610	0.0	2740	2360	5510	0.0	3300	2670	4400	0.0	2590	2280	5220	0.0	3090	2570
Ar(in²)	11	4550	0.2	2460	2130	5430	0.2	2970	2410	4350	0.2	2330	2050	5140	0.2	2780	2310
=12.48	13	4530	0.3	2150	1860	5400	0.3	2600	2100	4330	0.3	2040	1800	5110	0.3	2440	2020
	17	4480	0.4	1850	1600	5330	0.4	2230	1800	4280	0.4	1750	1540	5040	0.4	2090	1730
8-#11	21	4410	0.5	1540	1330	5230	0.5	1860	1500	4210	0.5	1450	1280	4950	0.5	1740	1440
4x-2y	25	4340	0.7	923	797	5120	0.7	1110	901	4140	0.7	872	769	4840	0.7	1040	866
	40	3940	0.9	307	265	4570	0.9	371	300	3750	0.9	290	256	4320	0.9	347	288
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2340	2340	10.80	10.80	2340	2340	10.80	10.80	2180	2180	10.80	10.80	2180	2180	10.80	10.80
1.96 %	0	5050	0.0	3400	3060	5950	0.0	3960	3370	4840	0.0	3250	2970	5660	0.0	3750	3260
Ar(in²)	11	4980	0.2	3060	2750	5860	0.2	3560	3030	4780	0.2	2920	2680	5570	0.2	3380	2930
=25.40	13	4960	0.3	2670	2410	5820	0.3	3120	2650	4750	0.3	2560	2340	5540	0.3	2950	2570
	17	4900	0.4	2290	2060	5740	0.4	2670	2270	4690	0.4	2190	2010	5450	0.4	2530	2200
20-#10	21	4820	0.5	1910	1720	5630	0.5	2230	1890	4610	0.5	1830	1670	5350	0.5	2110	1830
6x-6y	25	4720	0.7	1150	1030	5500	0.7	1340	1140	4520	0.7	1100	1000	5220	0.7	1270	1100
	40	4260	0.9	382	344	4860	0.9	445	378	4060	0.9	365	334	4610	0.9	422	366
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2330	2330	10.80	10.80	2330	2330	10.80	10.80	2170	2170	10.80	10.80	2170	2170	10.80	10.80
2.89 %	0	5460	0.0	4140	3570	6360	0.0	4710	3870	5250	0.0	3990	3490	6070	0.0	4500	3770
Ar(in²)	11	5380	0.2	3730	3210	6260	0.2	4240	3490	5180	0.2	3590	3140	5970	0.2	4050	3390
=37.44	13	5350	0.3	3260	2810	6220	0.3	3710	3050	5150	0.3	3150	2740	5930	0.3	3540	2970
	17	5280	0.4	2800	2410	6120	0.4	3180	2610	5080	0.4	2700	2350	5830	0.4	3040	2540
24-#11	21	5190	0.5	2330	2010	5990	0.5	2650	2180	4980	0.5	2250	1960	5710	0.5	2530	2120
8x-6y	25	5080	0.7	1400	1200	5850	0.7	1590	1310	4880	0.7	1350	1180	5570	0.7	1520	1270
	40	4540	0.9	466	401	5130	0.9	529	435	4340	0.9	449	392	4870	0.9	506	424
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2320	2320	10.80	10.80	2320	2320	10.80	10.80	2160	2160	10.80	10.80	2160	2160	10.80	10.80
3.70 %	0	5820	0.0	4660	4380	6720	0.0	5230	4680	5610	0.0	4510	4290	6430	0.0	5020	4580
Ar(in²)	11	5730	0.2	4200	3940	6610	0.2	4700	4210	5530	0.2	4060	3860	6320	0.2	4520	4120
=48.00	13	5700	0.3	3670	3450	6560	0.3	4120	3690	5490	0.3	3560	3380	6270	0.3	3950	3600
	17	5620	0.4	3150	2950	6450	0.4	3530	3160	5410	0.4	3050	2900	6160	0.4	3390	3090
12-#18	21	5510	0.5	2620	2460	6310	0.5	2940	2630	5310	0.5	2540	2410	6030	0.5	2820	2570
4x-4y	25	5390	0.7	1570	1480	6150	0.7	1760	1580	5180	0.7	1520	1450	5870	0.7	1690	1540
	40	4780	0.9	524	492	5350	0.9	588	526	4570	0.9	507	482	5080	0.9	564	514
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2320	2320	10.80	10.80	2320	2320	10.80	10.80	2160	2160	10.80	10.80	2160	2160	10.80	10.80

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi_c = 0.85$ f'c : 3.0 ksi NW
$\phi_b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 36 x 36

Designation		W 14 x211								W 14 x193							
Fy (ksi)		36				50				36				50			
Reinf.	KL	$\phi_c P_n$	$P_u/(\phi_c P_n)$	Mux	Muy	$\phi_c P_n$	$P_u/(\phi_c P_n)$	Mux	Muy	$\phi_c P_n$	$P_u/(\phi_c P_n)$	Mux	Muy	$\phi_c P_n$	$P_u/(\phi_c P_n)$	Mux	Muy
.48 %	0	4000	0.0	2030	1870	4740	0.0	2480	2140	3850	0.0	1920	1810	4520	0.0	2340	2070
Ar(in²)	11	3950	0.2	1820	1690	4670	0.2	2230	1930	3800	0.2	1730	1630	4460	0.2	2100	1860
= 6.24	13	3930	0.3	1600	1480	4650	0.3	1950	1690	3780	0.3	1510	1420	4440	0.3	1840	1630
	17	3890	0.4	1370	1270	4580	0.4	1680	1450	3740	0.4	1300	1220	4370	0.4	1580	1390
4-#11	21	3830	0.5	1140	1050	4500	0.5	1400	1210	3680	0.5	1080	1020	4300	0.5	1310	1160
2x-2y	25	3760	0.7	684	632	4410	0.7	837	723	3620	0.7	648	610	4210	0.7	788	697
	40	3420	0.9	228	210	3940	0.9	279	241	3280	0.9	216	203	3750	0.9	262	232
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2030	2030	10.80	10.80	2030	2030	10.80	10.80	1910	1910	10.80	10.80	1910	1910	10.80	10.80
.96 %	0	4210	0.0	2450	2200	4950	0.0	2910	2470	4060	0.0	2350	2130	4740	0.0	2760	2390
Ar(in²)	11	4160	0.2	2210	1980	4880	0.2	2620	2220	4010	0.2	2110	1920	4670	0.2	2480	2150
=12.48	13	4140	0.3	1930	1730	4850	0.3	2290	1940	3990	0.3	1850	1680	4640	0.3	2170	1880
	17	4090	0.4	1650	1480	4780	0.4	1960	1670	3940	0.4	1580	1440	4570	0.4	1860	1610
8-#11	21	4030	0.5	1380	1240	4690	0.5	1630	1390	3880	0.5	1320	1200	4490	0.5	1550	1340
4x-2y	25	3950	0.7	827	742	4590	0.7	980	833	3800	0.7	791	720	4390	0.7	931	806
	40	3580	0.9	275	247	4080	0.9	326	277	3430	0.9	263	240	3900	0.9	310	268
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2030	2030	10.80	10.80	2030	2030	10.80	10.80	1910	1910	10.80	10.80	1910	1910	10.80	10.80
1.96 %	0	4650	0.0	3110	2890	5390	0.0	3570	3160	4500	0.0	3010	2830	5180	0.0	3420	3080
Ar(in²)	11	4590	0.2	2800	2610	5310	0.2	3210	2850	4440	0.2	2700	2550	5090	0.2	3080	2780
=25.40	13	4560	0.3	2450	2280	5270	0.3	2810	2490	4410	0.3	2370	2230	5060	0.3	2690	2430
	17	4500	0.4	2100	1950	5190	0.4	2410	2140	4350	0.4	2030	1910	4980	0.4	2310	2080
20-#10	21	4430	0.5	1750	1630	5090	0.5	2010	1780	4280	0.5	1690	1590	4880	0.5	1920	1730
6x-6y	25	4330	0.7	1050	977	4970	0.7	1200	1070	4190	0.7	1010	954	4760	0.7	1150	1040
	40	3880	0.9	349	325	4370	0.9	401	355	3740	0.9	338	318	4180	0.9	384	346
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2020	2020	10.80	10.80	2020	2020	10.80	10.80	1900	1900	10.80	10.80	1900	1900	10.80	10.80
2.89 %	0	5060	0.0	3860	3410	5800	0.0	4310	3670	4910	0.0	3750	3340	5590	0.0	4170	3590
Ar(in²)	11	4990	0.2	3470	3070	5700	0.2	3880	3310	4840	0.2	3380	3010	5490	0.2	3750	3230
=37.44	13	4960	0.3	3040	2680	5670	0.3	3400	2890	4810	0.3	2960	2630	5450	0.3	3280	2830
	17	4890	0.4	2600	2300	5570	0.4	2910	2480	4740	0.4	2530	2250	5360	0.4	2810	2430
24-#11	21	4800	0.5	2170	1920	5450	0.5	2430	2070	4640	0.5	2110	1880	5240	0.5	2340	2020
8x-6y	25	4690	0.7	1300	1150	5310	0.7	1460	1240	4540	0.7	1270	1130	5110	0.7	1410	1210
	40	4160	0.9	434	383	4630	0.9	485	413	4010	0.9	422	375	4430	0.9	468	404
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2020	2020	10.80	10.80	2020	2020	10.80	10.80	1900	1900	10.80	10.80	1900	1900	10.80	10.80
3.70 %	0	5430	0.0	4380	4210	6160	0.0	4830	4480	5270	0.0	4270	4150	5950	0.0	4690	4400
Ar(in²)	11	5340	0.2	3940	3790	6050	0.2	4350	4030	5190	0.2	3850	3730	5840	0.2	4220	3960
=48.00	13	5300	0.3	3450	3320	6010	0.3	3810	3530	5150	0.3	3370	3270	5800	0.3	3690	3470
	17	5220	0.4	2960	2840	5900	0.4	3260	3020	5070	0.4	2890	2800	5690	0.4	3160	2970
12-#18	21	5120	0.5	2460	2370	5770	0.5	2720	2520	4960	0.5	2400	2330	5560	0.5	2640	2480
4x-4y	25	4990	0.7	1480	1420	5610	0.7	1630	1510	4840	0.7	1440	1400	5400	0.7	1580	1490
	40	4390	0.9	492	474	4840	0.9	543	503	4230	0.9	480	466	4640	0.9	527	495
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2010	2010	10.80	10.80	2010	2010	10.80	10.80	1890	1890	10.80	10.80	1890	1890	10.80	10.80

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for $\phi_c P_n$, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕ_bMnx and Muy = ϕ_bMny when $P_u/(\phi_c P_n)$ = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 36 x 36

Designation		W 12 x336								W 12 x305							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.48 %	0	5070	0.0	2710	2160	6240	0.0	3400	2470	4800	0.0	2520	2070	5870	0.0	3140	2360
Ar(in²)	11	5020	0.2	2440	1940	6160	0.2	3060	2220	4750	0.2	2270	1860	5790	0.2	2820	2120
= 6.24	13	4990	0.3	2130	1700	6130	0.3	2680	1940	4730	0.3	1980	1630	5760	0.3	2470	1860
	17	4940	0.4	1830	1460	6050	0.4	2300	1660	4680	0.4	1700	1400	5690	0.4	2120	1590
4-#11	21	4880	0.5	1520	1210	5960	0.5	1910	1390	4620	0.5	1420	1160	5590	0.5	1770	1330
2x-2y	25	4800	0.7	914	727	5840	0.7	1150	832	4540	0.7	850	698	5480	0.7	1060	795
	40	4410	0.9	304	242	5260	0.9	382	277	4160	0.9	283	232	4930	0.9	353	265
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2870	2870	10.80	10.80	2870	2870	10.80	10.80	2660	2660	10.80	10.80	2660	2660	10.80	10.80
.96 %	0	5280	0.0	3130	2480	6460	0.0	3820	2790	5010	0.0	2940	2400	6080	0.0	3560	2680
Ar(in²)	11	5220	0.2	2820	2230	6370	0.2	3440	2510	4960	0.2	2650	2160	6000	0.2	3210	2410
=12.48	13	5200	0.3	2470	1950	6340	0.3	3010	2200	4940	0.3	2320	1890	5970	0.3	2810	2110
	17	5140	0.4	2110	1670	6250	0.4	2580	1880	4880	0.4	1990	1620	5890	0.4	2400	1810
8-#11	21	5070	0.5	1760	1400	6150	0.5	2150	1570	4810	0.5	1660	1350	5790	0.5	2000	1510
4x-2y	25	4990	0.7	1060	837	6020	0.7	1290	941	4730	0.7	993	808	5670	0.7	1200	904
	40	4570	0.9	352	279	5410	0.9	430	313	4320	0.9	331	269	5080	0.9	400	301
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2860	2860	10.80	10.80	2860	2860	10.80	10.80	2650	2650	10.80	10.80	2650	2650	10.80	10.80
1.96 %	0	5720	0.0	3790	3170	6900	0.0	4480	3480	5460	0.0	3600	3090	6520	0.0	4220	3370
Ar(in²)	11	5660	0.2	3410	2860	6800	0.2	4030	3130	5390	0.2	3240	2780	6430	0.2	3800	3040
=25.40	13	5630	0.3	2980	2500	6760	0.3	3530	2740	5360	0.3	2840	2430	6390	0.3	3320	2660
	17	5560	0.4	2560	2140	6670	0.4	3020	2350	5300	0.4	2430	2080	6300	0.4	2850	2280
20-#10	21	5480	0.5	2130	1790	6550	0.5	2520	1960	5220	0.5	2030	1740	6180	0.5	2370	1900
6x-6y	25	5380	0.7	1280	1070	6400	0.7	1510	1180	5120	0.7	1220	1040	6050	0.7	1420	1140
	40	4890	0.9	426	357	5700	0.9	504	391	4640	0.9	405	347	5370	0.9	474	379
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2860	2860	10.80	10.80	2860	2860	10.80	10.80	2650	2650	10.80	10.80	2650	2650	10.80	10.80
2.89 %	0	6130	0.0	4540	3680	7310	0.0	5230	3990	5870	0.0	4350	3600	6930	0.0	4970	3880
Ar(in²)	11	6060	0.2	4080	3310	7200	0.2	4710	3590	5790	0.2	3910	3240	6830	0.2	4470	3490
=37.44	13	6030	0.3	3570	2900	7160	0.3	4120	3140	5760	0.3	3420	2830	6780	0.3	3910	3060
	17	5950	0.4	3060	2490	7050	0.4	3530	2690	5680	0.4	2940	2430	6680	0.4	3350	2620
24-#11	21	5850	0.5	2550	2070	6910	0.5	2940	2240	5590	0.5	2450	2020	6550	0.5	2790	2180
8x-6y	25	5740	0.7	1530	1240	6760	0.7	1760	1350	5480	0.7	1470	1210	6400	0.7	1680	1310
	40	5180	0.9	510	414	5970	0.9	588	448	4930	0.9	489	404	5640	0.9	558	436
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2850	2850	10.80	10.80	2850	2850	10.80	10.80	2640	2640	10.80	10.80	2640	2640	10.80	10.80
3.70 %	0	6500	0.0	5060	4490	7670	0.0	5750	4800	6230	0.0	4870	4400	7290	0.0	5490	4690
Ar(in²)	11	6410	0.2	4550	4040	7550	0.2	5170	4320	6140	0.2	4380	3960	7170	0.2	4940	4220
=48.00	13	6370	0.3	3980	3530	7500	0.3	4530	3780	6110	0.3	3830	3470	7130	0.3	4320	3690
	17	6290	0.4	3410	3030	7380	0.4	3880	3240	6020	0.4	3290	2970	7010	0.4	3700	3160
12-#18	21	6180	0.5	2840	2520	7230	0.5	3230	2700	5920	0.5	2740	2480	6870	0.5	3090	2640
4x-4y	25	6050	0.7	1710	1510	7060	0.7	1940	1620	5790	0.7	1640	1490	6700	0.7	1850	1580
	40	5430	0.9	568	504	6200	0.9	646	539	5170	0.9	547	495	5870	0.9	617	527
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2850	2850	10.80	10.80	2850	2850	10.80	10.80	2640	2640	10.80	10.80	2640	2640	10.80	10.80

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85   f'c : 3.0 ksi NW
φb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 36 x 36

Designation		W 12 x279								W 12 x252							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.48 %	0	4580	0.0	2360	2000	5550	0.0	2920	2260	4350	0.0	2210	1920	5230	0.0	2700	2170
Ar(in²)	11	4530	0.2	2130	1800	5480	0.2	2630	2040	4300	0.2	1990	1730	5160	0.2	2430	1950
= 6.24	13	4510	0.3	1860	1570	5450	0.3	2300	1780	4280	0.3	1740	1510	5130	0.3	2130	1710
	17	4460	0.4	1590	1350	5380	0.4	1970	1530	4230	0.4	1490	1300	5070	0.4	1830	1460
4-#11	21	4400	0.5	1330	1120	5290	0.5	1640	1270	4180	0.5	1240	1080	4980	0.5	1520	1220
2x-2y	25	4320	0.7	796	673	5180	0.7	985	763	4100	0.7	744	648	4880	0.7	912	731
	40	3960	0.9	265	224	4650	0.9	328	254	3750	0.9	248	216	4380	0.9	304	243
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2480	2480	10.80	10.80	2480	2480	10.80	10.80	2310	2310	10.80	10.80	2310	2310	10.80	10.80
.96 %	0	4790	0.0	2790	2320	5760	0.0	3340	2590	4560	0.0	2630	2250	5450	0.0	3130	2490
Ar(in²)	11	4740	0.2	2510	2090	5690	0.2	3010	2330	4510	0.2	2370	2020	5370	0.2	2820	2240
=12.48	13	4710	0.3	2190	1830	5650	0.3	2630	2040	4490	0.3	2070	1770	5340	0.3	2460	1960
	17	4660	0.4	1880	1570	5580	0.4	2260	1750	4440	0.4	1780	1520	5270	0.4	2110	1680
8-#11	21	4590	0.5	1570	1310	5480	0.5	1880	1460	4370	0.5	1480	1260	5170	0.5	1760	1400
4x-2y	25	4510	0.7	940	783	5370	0.7	1130	873	4290	0.7	887	757	5060	0.7	1060	841
	40	4110	0.9	313	261	4800	0.9	376	291	3900	0.9	295	252	4520	0.9	351	280
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2480	2480	10.80	10.80	2480	2480	10.80	10.80	2300	2300	10.80	10.80	2300	2300	10.80	10.80
1.96 %	0	5230	0.0	3440	3020	6210	0.0	4000	3280	5000	0.0	3290	2940	5890	0.0	3790	3190
Ar(in²)	11	5170	0.2	3100	2710	6110	0.2	3600	2950	4940	0.2	2960	2650	5800	0.2	3410	2870
=25.40	13	5140	0.3	2710	2370	6080	0.3	3150	2580	4910	0.3	2590	2310	5760	0.3	2980	2510
	17	5080	0.4	2320	2040	5990	0.4	2700	2210	4850	0.4	2220	1980	5680	0.4	2560	2150
20-#10	21	5000	0.5	1940	1700	5880	0.5	2250	1840	4770	0.5	1850	1650	5570	0.5	2130	1790
6x-6y	25	4900	0.7	1160	1020	5750	0.7	1350	1110	4680	0.7	1110	992	5440	0.7	1280	1080
	40	4430	0.9	387	339	5090	0.9	450	368	4220	0.9	369	330	4810	0.9	425	358
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2470	2470	10.80	10.80	2470	2470	10.80	10.80	2300	2300	10.80	10.80	2300	2300	10.80	10.80
2.89 %	0	5640	0.0	4190	3520	6620	0.0	4750	3790	5420	0.0	4030	3450	6300	0.0	4530	3690
Ar(in²)	11	5570	0.2	3770	3170	6510	0.2	4270	3410	5340	0.2	3630	3100	6200	0.2	4080	3320
=37.44	13	5540	0.3	3300	2770	6470	0.3	3740	2980	5310	0.3	3180	2720	6160	0.3	3570	2910
	17	5460	0.4	2830	2380	6370	0.4	3200	2560	5240	0.4	2720	2330	6060	0.4	3060	2490
24-#11	21	5370	0.5	2360	1980	6240	0.5	2670	2130	5150	0.5	2270	1940	5930	0.5	2550	2080
8x-6y	25	5260	0.7	1410	1190	6090	0.7	1600	1280	5040	0.7	1360	1160	5790	0.7	1530	1250
	40	4710	0.9	471	396	5360	0.9	534	426	4500	0.9	453	387	5070	0.9	509	415
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2470	2470	10.80	10.80	2470	2470	10.80	10.80	2290	2290	10.80	10.80	2290	2290	10.80	10.80
3.70 %	0	6000	0.0	4710	4330	6980	0.0	5270	4590	5780	0.0	4560	4260	6660	0.0	5050	4500
Ar(in²)	11	5920	0.2	4240	3900	6860	0.2	4740	4130	5690	0.2	4100	3830	6540	0.2	4550	4050
=48.00	13	5880	0.3	3710	3410	6820	0.3	4150	3620	5660	0.3	3590	3350	6500	0.3	3980	3540
	17	5800	0.4	3180	2920	6700	0.4	3560	3100	5570	0.4	3080	2870	6390	0.4	3410	3040
12-#18	21	5690	0.5	2650	2440	6560	0.5	2960	2580	5470	0.5	2560	2390	6250	0.5	2840	2530
4x-4y	25	5570	0.7	1590	1460	6400	0.7	1780	1550	5340	0.7	1540	1440	6090	0.7	1710	1520
	40	4950	0.9	529	487	5580	0.9	592	516	4730	0.9	512	478	5290	0.9	568	506
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2460	2460	10.80	10.80	2460	2460	10.80	10.80	2290	2290	10.80	10.80	2290	2290	10.80	10.80

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 36 x 36

Designation		W 12 x230								W 12 x210							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.48 %	0	4160	0.0	2080	1860	4970	0.0	2530	2090	3990	0.0	1970	1800	4730	0.0	2380	2020
Ar(in²)	11	4120	0.2	1870	1670	4900	0.2	2280	1880	3950	0.2	1770	1620	4660	0.2	2140	1820
= 6.24	13	4100	0.3	1640	1460	4880	0.3	2000	1650	3930	0.3	1550	1410	4640	0.3	1870	1590
	17	4050	0.4	1410	1250	4810	0.4	1710	1410	3880	0.4	1330	1210	4570	0.4	1610	1360
4-#11	21	3990	0.5	1170	1040	4730	0.5	1430	1180	3830	0.5	1110	1010	4490	0.5	1340	1130
2x-2y	25	3920	0.7	702	626	4630	0.7	855	705	3760	0.7	664	606	4400	0.7	802	680
	40	3580	0.9	234	208	4150	0.9	285	235	3420	0.9	221	202	3930	0.9	267	226
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2160	2160	10.80	10.80	2160	2160	10.80	10.80	2030	2030	10.80	10.80	2030	2030	10.80	10.80
.96 %	0	4380	0.0	2510	2180	5180	0.0	2960	2420	4210	0.0	2390	2120	4940	0.0	2800	2340
Ar(in²)	11	4320	0.2	2260	1960	5110	0.2	2660	2170	4150	0.2	2150	1910	4870	0.2	2520	2110
=12.48	13	4300	0.3	1970	1720	5080	0.3	2330	1900	4130	0.3	1880	1670	4840	0.3	2210	1840
	17	4250	0.4	1690	1470	5010	0.4	2000	1630	4080	0.4	1610	1430	4770	0.4	1890	1580
8-#11	21	4190	0.5	1410	1230	4920	0.5	1660	1360	4020	0.5	1350	1190	4690	0.5	1580	1320
4x-2y	25	4110	0.7	845	736	4810	0.7	998	815	3950	0.7	807	715	4580	0.7	945	790
	40	3730	0.9	281	245	4290	0.9	332	271	3570	0.9	269	238	4080	0.9	315	263
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2160	2160	10.80	10.80	2160	2160	10.80	10.80	2020	2020	10.80	10.80	2020	2020	10.80	10.80
1.96 %	0	4820	0.0	3160	2880	5620	0.0	3620	3110	4650	0.0	3050	2820	5380	0.0	3460	3030
Ar(in²)	11	4750	0.2	2850	2590	5540	0.2	3250	2800	4580	0.2	2750	2530	5300	0.2	3110	2730
=25.40	13	4730	0.3	2490	2270	5500	0.3	2850	2450	4560	0.3	2400	2220	5260	0.3	2720	2390
	17	4670	0.4	2140	1940	5420	0.4	2440	2100	4500	0.4	2060	1900	5180	0.4	2340	2050
20-#10	21	4590	0.5	1780	1620	5310	0.5	2030	1750	4420	0.5	1720	1580	5080	0.5	1950	1710
6x-6y	25	4500	0.7	1070	970	5190	0.7	1220	1050	4330	0.7	1030	950	4960	0.7	1170	1020
	40	4040	0.9	355	323	4580	0.9	406	349	3880	0.9	343	316	4360	0.9	389	341
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2150	2150	10.80	10.80	2150	2150	10.80	10.80	2020	2020	10.80	10.80	2020	2020	10.80	10.80
2.89 %	0	5230	0.0	3910	3390	6040	0.0	4360	3620	5060	0.0	3800	3330	5790	0.0	4210	3540
Ar(in²)	11	5150	0.2	3520	3050	5940	0.2	3930	3250	4980	0.2	3420	2990	5700	0.2	3790	3190
=37.44	13	5130	0.3	3080	2670	5900	0.3	3440	2850	4950	0.3	2990	2620	5660	0.3	3310	2790
	17	5050	0.4	2640	2290	5800	0.4	2950	2440	4880	0.4	2560	2250	5560	0.4	2840	2390
24-#11	21	4960	0.5	2200	1900	5680	0.5	2450	2030	4790	0.5	2140	1870	5440	0.5	2370	1990
8x-6y	25	4850	0.7	1320	1140	5540	0.7	1470	1220	4680	0.7	1280	1120	5300	0.7	1420	1200
	40	4320	0.9	440	380	4840	0.9	490	406	4150	0.9	427	374	4620	0.9	473	398
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2150	2150	10.80	10.80	2150	2150	10.80	10.80	2010	2010	10.80	10.80	2010	2010	10.80	10.80
3.70 %	0	5590	0.0	4430	4190	6400	0.0	4880	4420	5420	0.0	4320	4130	6150	0.0	4730	4350
Ar(in²)	11	5500	0.2	3990	3770	6280	0.2	4400	3980	5330	0.2	3890	3720	6040	0.2	4250	3920
=48.00	13	5470	0.3	3490	3300	6240	0.3	3850	3480	5300	0.3	3400	3260	6000	0.3	3720	3430
	17	5390	0.4	2990	2830	6130	0.4	3300	2990	5220	0.4	2910	2790	5890	0.4	3190	2940
12-#18	21	5280	0.5	2490	2360	5990	0.5	2750	2490	5110	0.5	2430	2330	5760	0.5	2660	2450
4x-4y	25	5160	0.7	1500	1420	5830	0.7	1650	1490	4990	0.7	1460	1400	5600	0.7	1600	1470
	40	4550	0.9	498	471	5050	0.9	549	497	4380	0.9	485	465	4830	0.9	531	489
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		2140	2140	10.80	10.80	2140	2140	10.80	10.80	2010	2010	10.80	10.80	2010	2010	10.80	10.80

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 36 x 36

Designation		W 12 x190								W							
Fy (ksi)		36				50											
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy								
.48 %	0	3820	0.0	1860	1730	4480	0.0	2220	1940								
Ar(in²)	11	3770	0.2	1670	1560	4420	0.2	2000	1750								
= 6.24	13	3750	0.3	1460	1360	4390	0.3	1750	1530								
	17	3710	0.4	1250	1170	4330	0.4	1500	1310								
4-#11	21	3650	0.5	1040	974	4260	0.5	1250	1090								
2x-2y	25	3590	0.7	626	584	4170	0.7	750	655								
	40	3260	0.9	208	194	3720	0.9	250	218								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		1890	1890	10.80	10.80	1890	1890	10.80	10.80								
.96 %	0	4030	0.0	2280	2060	4700	0.0	2650	2270								
Ar(in²)	11	3980	0.2	2050	1850	4630	0.2	2380	2040								
=12.48	13	3960	0.3	1800	1620	4600	0.3	2090	1780								
	17	3910	0.4	1540	1390	4530	0.4	1790	1530								
8-#11	21	3850	0.5	1280	1160	4450	0.5	1490	1270								
4x-2y	25	3770	0.7	769	694	4350	0.7	893	764								
	40	3410	0.9	256	231	3860	0.9	297	254								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		1890	1890	10.80	10.80	1890	1890	10.80	10.80								
1.96 %	0	4470	0.0	2940	2750	5140	0.0	3310	2960								
Ar(in²)	11	4410	0.2	2640	2480	5050	0.2	2980	2660								
=25.40	13	4390	0.3	2310	2170	5020	0.3	2600	2330								
	17	4320	0.4	1980	1860	4940	0.4	2230	2000								
20-#10	21	4250	0.5	1650	1550	4840	0.5	1860	1660								
6x-6y	25	4160	0.7	991	928	4720	0.7	1120	998								
	40	3710	0.9	330	309	4140	0.9	371	332								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1880	1880	10.80	10.80	1880	1880	10.80	10.80								
2.89 %	0	4880	0.0	3690	3260	5550	0.0	4050	3470								
Ar(in²)	11	4810	0.2	3320	2940	5450	0.2	3650	3120								
=37.44	13	4780	0.3	2900	2570	5410	0.3	3190	2730								
	17	4710	0.4	2490	2200	5320	0.4	2740	2340								
24-#11	21	4620	0.5	2070	1840	5200	0.5	2280	1950								
8x-6y	25	4510	0.7	1240	1100	5070	0.7	1370	1170								
	40	3980	0.9	414	367	4390	0.9	456	390								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		1880	1880	10.80	10.80	1880	1880	10.80	10.80								
3.70 %	0	5250	0.0	4210	4070	5910	0.0	4570	4280								
Ar(in²)	11	5160	0.2	3790	3660	5800	0.2	4120	3850								
=48.00	13	5120	0.3	3310	3210	5760	0.3	3600	3370								
	17	5040	0.4	2840	2750	5650	0.4	3090	2890								
12-#18	21	4940	0.5	2370	2290	5520	0.5	2570	2410								
4x-4y	25	4810	0.7	1420	1370	5360	0.7	1540	1440								
	40	4210	0.9	473	458	4610	0.9	514	481								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 24 in		1870	1870	10.80	10.80	1870	1870	10.80	10.80								

Notes : 1. $Cex = Pex(KxLx)^2/10000.$ (kip-ft²), $Cey = Pey(KyLy)^2/10000.$ (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 32 x 36

Designation		W 14 x426								W 14 x398							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	5610	0.0	3370	2320	7100	0.0	4330	2790	5380	0.0	3170	2230	6770	0.0	4070	2660
Ar(in²)	11	5540	0.2	3030	2090	6990	0.2	3900	2510	5310	0.2	2860	2010	6660	0.2	3660	2400
= 6.24	13	5510	0.3	2650	1820	6940	0.3	3410	2190	5280	0.3	2500	1760	6620	0.3	3210	2100
	17	5440	0.4	2270	1560	6830	0.4	2920	1880	5220	0.4	2140	1510	6520	0.4	2750	1800
4-#11	21	5360	0.5	1890	1300	6700	0.5	2440	1570	5140	0.5	1790	1250	6390	0.5	2290	1500
2x-2y	25	5260	0.7	1140	782	6540	0.7	1460	939	5040	0.7	1070	752	6240	0.7	1370	899
	40	4760	0.9	378	260	5760	0.9	487	313	4550	0.9	357	250	5490	0.9	458	299
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		3390	2680	10.80	9.60	3390	2680	10.80	9.60	3210	2540	10.80	9.60	3210	2540	10.80	9.60
1.04 %	0	5810	0.0	3720	2600	7290	0.0	4690	3070	5570	0.0	3530	2510	6970	0.0	4430	2950
Ar(in²)	11	5730	0.2	3350	2340	7180	0.2	4220	2760	5500	0.2	3180	2260	6850	0.2	3980	2650
=12.00	13	5700	0.3	2930	2050	7130	0.3	3690	2420	5470	0.3	2780	1980	6810	0.3	3490	2320
	17	5630	0.4	2510	1750	7020	0.4	3160	2070	5400	0.4	2380	1700	6700	0.4	2990	1990
12-# 9	21	5540	0.5	2090	1460	6870	0.5	2640	1730	5310	0.5	1990	1410	6560	0.5	2490	1660
4x-4y	25	5430	0.7	1260	877	6710	0.7	1580	1040	5210	0.7	1190	848	6400	0.7	1490	994
	40	4890	0.9	418	292	5890	0.9	527	345	4690	0.9	397	282	5610	0.9	497	331
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		3390	2680	10.80	9.60	3390	2680	10.80	9.60	3210	2530	10.80	9.60	3210	2530	10.80	9.60
2.08 %	0	6220	0.0	4250	3180	7700	0.0	5210	3650	5980	0.0	4060	3090	7380	0.0	4950	3520
Ar(in²)	11	6130	0.2	3820	2860	7570	0.2	4680	3280	5900	0.2	3660	2780	7250	0.2	4450	3170
=24.00	13	6100	0.3	3350	2500	7520	0.3	4100	2870	5870	0.3	3200	2430	7200	0.3	3900	2780
	17	6010	0.4	2870	2150	7390	0.4	3510	2460	5790	0.4	2740	2090	7080	0.4	3340	2380
24-# 9	21	5910	0.5	2390	1790	7240	0.5	2930	2050	5680	0.5	2290	1740	6920	0.5	2780	1980
6x-8y	25	5790	0.7	1430	1070	7050	0.7	1760	1230	5560	0.7	1370	1040	6740	0.7	1670	1190
	40	5180	0.9	477	357	6140	0.9	585	410	4970	0.9	457	347	5860	0.9	556	396
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		3380	2670	10.80	9.60	3380	2670	10.80	9.60	3200	2530	10.80	9.60	3200	2530	10.80	9.60
3.13 %	0	6630	0.0	5200	3540	8110	0.0	6160	4000	6390	0.0	5010	3450	7790	0.0	5900	3880
Ar(in²)	11	6530	0.2	4680	3180	7970	0.2	5540	3600	6300	0.2	4510	3100	7640	0.2	5310	3490
=36.00	13	6490	0.3	4090	2790	7910	0.3	4850	3150	6260	0.3	3940	2720	7590	0.3	4650	3060
	17	6400	0.4	3510	2390	7770	0.4	4160	2700	6170	0.4	3380	2330	7450	0.4	3980	2620
16-#14	21	6280	0.5	2920	1990	7600	0.5	3460	2250	6050	0.5	2820	1940	7280	0.5	3320	2180
6x-4y	25	6140	0.7	1750	1190	7390	0.7	2080	1350	5910	0.7	1690	1160	7080	0.7	1990	1310
	40	5450	0.9	584	397	6390	0.9	692	450	5240	0.9	563	388	6110	0.9	663	436
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		3380	2670	10.80	9.60	3380	2670	10.80	9.60	3200	2520	10.80	9.60	3200	2520	10.80	9.60
3.91 %	0	6930	0.0	5470	4060	8420	0.0	6430	4530	6700	0.0	5280	3970	8090	0.0	6170	4400
Ar(in²)	11	6830	0.2	4920	3650	8260	0.2	5780	4070	6600	0.2	4750	3570	7940	0.2	5550	3960
=45.00	13	6790	0.3	4310	3200	8200	0.3	5060	3560	6550	0.3	4160	3130	7880	0.3	4860	3470
	17	6680	0.4	3690	2740	8050	0.4	4340	3050	6450	0.4	3560	2680	7730	0.4	4160	2970
20-#14	21	6550	0.5	3080	2280	7860	0.5	3620	2550	6330	0.5	2970	2230	7550	0.5	3470	2480
6x-6y	25	6400	0.7	1850	1370	7640	0.7	2170	1530	6180	0.7	1780	1340	7330	0.7	2080	1490
	40	5650	0.9	615	456	6570	0.9	723	509	5440	0.9	593	446	6290	0.9	694	495
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		3370	2660	10.80	9.60	3370	2660	10.80	9.60	3190	2520	10.80	9.60	3190	2520	10.80	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²),   Cey = Pey(KyLy)²/10000. (kip-ft²),   KL in ft,   rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 36

Designation		W 14 x370								W 14 x342							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	5140	0.0	2990	2150	6440	0.0	3820	2550	4910	0.0	2800	2060	6110	0.0	3570	2430
Ar(in^2)	11	5080	0.2	2690	1930	6340	0.2	3440	2290	4850	0.2	2520	1850	6020	0.2	3210	2190
= 6.24	13	5050	0.3	2350	1690	6300	0.3	3010	2010	4820	0.3	2210	1620	5980	0.3	2810	1910
	17	4990	0.4	2020	1450	6200	0.4	2580	1720	4760	0.4	1890	1390	5880	0.4	2410	1640
4-#11	21	4910	0.5	1680	1210	6080	0.5	2150	1430	4680	0.5	1580	1160	5760	0.5	2010	1370
2x-2y	25	4820	0.7	1010	724	5930	0.7	1290	859	4590	0.7	945	694	5620	0.7	1200	820
	40	4340	0.9	336	241	5210	0.9	429	286	4140	0.9	315	231	4940	0.9	401	273
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		3030	2390	10.80	9.60	3030	2390	10.80	9.60	2850	2250	10.80	9.60	2850	2250	10.80	9.60
1.04 %	0	5340	0.0	3340	2430	6640	0.0	4180	2830	5110	0.0	3160	2340	6310	0.0	3920	2710
Ar(in^2)	11	5270	0.2	3010	2180	6530	0.2	3760	2550	5040	0.2	2840	2110	6210	0.2	3530	2440
=12.00	13	5240	0.3	2630	1910	6490	0.3	3290	2230	5010	0.3	2490	1840	6160	0.3	3090	2140
	17	5170	0.4	2260	1640	6380	0.4	2820	1910	4950	0.4	2130	1580	6060	0.4	2650	1830
12-# 9	21	5090	0.5	1880	1370	6250	0.5	2350	1590	4860	0.5	1780	1320	5940	0.5	2210	1530
4x-4y	25	4990	0.7	1130	819	6090	0.7	1410	954	4760	0.7	1070	789	5790	0.7	1320	915
	40	4480	0.9	376	273	5330	0.9	469	318	4270	0.9	355	263	5060	0.9	441	305
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		3030	2390	10.80	9.60	3030	2390	10.80	9.60	2840	2250	10.80	9.60	2840	2250	10.80	9.60
2.08 %	0	5750	0.0	3880	3010	7050	0.0	4700	3410	5520	0.0	3700	2920	6720	0.0	4450	3290
Ar(in^2)	11	5670	0.2	3490	2710	6930	0.2	4230	3070	5440	0.2	3330	2630	6600	0.2	4000	2960
=24.00	13	5640	0.3	3060	2370	6880	0.3	3700	2680	5410	0.3	2920	2300	6560	0.3	3500	2590
	17	5560	0.4	2620	2030	6760	0.4	3170	2300	5330	0.4	2500	1970	6440	0.4	3000	2220
24-# 9	21	5460	0.5	2180	1690	6610	0.5	2640	1920	5230	0.5	2080	1640	6300	0.5	2500	1850
6x-8y	25	5340	0.7	1310	1010	6440	0.7	1580	1150	5120	0.7	1250	985	6130	0.7	1500	1110
	40	4760	0.9	436	338	5580	0.9	528	383	4550	0.9	416	328	5310	0.9	500	370
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		3020	2390	10.80	9.60	3020	2390	10.80	9.60	2840	2240	10.80	9.60	2840	2240	10.80	9.60
3.13 %	0	6160	0.0	4820	3370	7460	0.0	5650	3770	5930	0.0	4640	3280	7130	0.0	5400	3650
Ar(in^2)	11	6070	0.2	4340	3030	7320	0.2	5080	3390	5840	0.2	4170	2950	7000	0.2	4860	3280
=36.00	13	6030	0.3	3800	2650	7270	0.3	4450	2970	5800	0.3	3650	2580	6940	0.3	4250	2870
	17	5940	0.4	3250	2270	7130	0.4	3810	2540	5710	0.4	3130	2210	6810	0.4	3640	2460
16-#14	21	5820	0.5	2710	1890	6970	0.5	3180	2120	5600	0.5	2610	1840	6650	0.5	3040	2050
6x-4y	25	5690	0.7	1630	1140	6770	0.7	1910	1270	5460	0.7	1560	1110	6460	0.7	1820	1230
	40	5030	0.9	542	378	5830	0.9	635	423	4810	0.9	521	368	5550	0.9	607	410
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		3010	2380	10.80	9.60	3010	2380	10.80	9.60	2830	2240	10.80	9.60	2830	2240	10.80	9.60
3.91 %	0	6470	0.0	5090	3890	7770	0.0	5920	4290	6240	0.0	4910	3800	7440	0.0	5670	4170
Ar(in^2)	11	6360	0.2	4580	3500	7620	0.2	5330	3860	6130	0.2	4420	3420	7290	0.2	5100	3750
=45.00	13	6320	0.3	4010	3060	7560	0.3	4660	3380	6090	0.3	3860	2990	7230	0.3	4460	3280
	17	6220	0.4	3440	2620	7410	0.4	4000	2890	5990	0.4	3310	2570	7090	0.4	3830	2820
20-#14	21	6100	0.5	2860	2190	7230	0.5	3330	2410	5870	0.5	2760	2140	6920	0.5	3190	2350
6x-6y	25	5950	0.7	1720	1310	7020	0.7	2000	1450	5720	0.7	1660	1280	6710	0.7	1910	1410
	40	5220	0.9	572	437	6000	0.9	665	482	5010	0.9	551	427	5720	0.9	637	469
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		3010	2380	10.80	9.60	3010	2380	10.80	9.60	2830	2230	10.80	9.60	2830	2230	10.80	9.60

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD ϕc = 0.85 f'c : 3.0 ksi NW

ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 36

Designation		W 14 x311								W 14 x283							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.54 %	0	4630	0.0	2600	1960	5720	0.0	3290	2300	4400	0.0	2430	1870	5390	0.0	3050	2190
Ar(in²)	11	4570	0.2	2340	1770	5630	0.2	2970	2070	4340	0.2	2180	1690	5300	0.2	2750	1970
= 6.24	13	4550	0.3	2050	1540	5590	0.3	2590	1810	4310	0.3	1910	1480	5260	0.3	2400	1730
	17	4490	0.4	1760	1320	5500	0.4	2220	1550	4260	0.4	1640	1260	5180	0.4	2060	1480
4-#11	21	4410	0.5	1460	1100	5390	0.5	1850	1300	4190	0.5	1370	1050	5070	0.5	1720	1230
2x-2y	25	4330	0.7	878	661	5260	0.7	1110	777	4100	0.7	819	632	4950	0.7	1030	739
	40	3890	0.9	292	220	4600	0.9	370	259	3680	0.9	273	210	4330	0.9	343	246
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2630	2080	10.80	9.60	2630	2080	10.80	9.60	2440	1930	10.80	9.60	2440	1930	10.80	9.60
1.04 %	0	4830	0.0	2960	2240	5920	0.0	3650	2590	4590	0.0	2780	2160	5590	0.0	3410	2470
Ar(in²)	11	4760	0.2	2660	2020	5820	0.2	3290	2330	4530	0.2	2500	1940	5490	0.2	3070	2230
=12.00	13	4740	0.3	2330	1770	5780	0.3	2870	2040	4500	0.3	2190	1700	5450	0.3	2680	1950
	17	4670	0.4	2000	1510	5680	0.4	2460	1750	4440	0.4	1880	1460	5360	0.4	2300	1670
12-# 9	21	4590	0.5	1660	1260	5560	0.5	2050	1450	4360	0.5	1570	1210	5250	0.5	1920	1390
4x-4y	25	4500	0.7	998	757	5420	0.7	1230	872	4270	0.7	939	727	5110	0.7	1150	834
	40	4020	0.9	332	252	4730	0.9	410	290	3810	0.9	313	242	4450	0.9	383	278
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2630	2070	10.80	9.60	2630	2070	10.80	9.60	2440	1930	10.80	9.60	2440	1930	10.80	9.60
2.08 %	0	5240	0.0	3510	2820	6330	0.0	4180	3160	5000	0.0	3330	2740	6000	0.0	3940	3050
Ar(in²)	11	5160	0.2	3160	2540	6210	0.2	3760	2850	4930	0.2	3000	2460	5890	0.2	3550	2750
=24.00	13	5130	0.3	2760	2220	6170	0.3	3290	2490	4900	0.3	2620	2150	5840	0.3	3100	2400
	17	5050	0.4	2370	1910	6060	0.4	2820	2140	4820	0.4	2250	1850	5740	0.4	2660	2060
24-# 9	21	4960	0.5	1970	1590	5920	0.5	2350	1780	4730	0.5	1870	1540	5600	0.5	2220	1720
6x-8y	25	4850	0.7	1180	952	5760	0.7	1410	1070	4620	0.7	1120	923	5450	0.7	1330	1030
	40	4290	0.9	394	317	4970	0.9	470	355	4080	0.9	374	307	4690	0.9	443	343
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2620	2070	10.80	9.60	2620	2070	10.80	9.60	2440	1930	10.80	9.60	2440	1930	10.80	9.60
3.13 %	0	5650	0.0	4440	3180	6740	0.0	5130	3520	5410	0.0	4260	3100	6410	0.0	4880	3410
Ar(in²)	11	5560	0.2	3990	2860	6610	0.2	4610	3170	5320	0.2	3830	2790	6280	0.2	4400	3070
=36.00	13	5520	0.3	3490	2510	6560	0.3	4040	2770	5290	0.3	3350	2440	6230	0.3	3850	2690
	17	5430	0.4	2990	2150	6430	0.4	3460	2380	5200	0.4	2880	2090	6110	0.4	3300	2300
16-#14	21	5320	0.5	2500	1790	6280	0.5	2880	1980	5090	0.5	2400	1740	5960	0.5	2750	1920
6x-4y	25	5190	0.7	1500	1070	6090	0.7	1730	1190	4960	0.7	1440	1040	5780	0.7	1650	1150
	40	4550	0.9	499	358	5210	0.9	576	396	4340	0.9	479	348	4930	0.9	549	383
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2610	2070	10.80	9.60	2610	2070	10.80	9.60	2430	1920	10.80	9.60	2430	1920	10.80	9.60
3.91 %	0	5960	0.0	4710	3710	7040	0.0	5400	4040	5720	0.0	4530	3620	6710	0.0	5150	3930
Ar(in²)	11	5860	0.2	4240	3340	6900	0.2	4860	3640	5620	0.2	4080	3260	6570	0.2	4640	3540
=45.00	13	5820	0.3	3710	2920	6850	0.3	4250	3190	5580	0.3	3570	2850	6520	0.3	4060	3100
	17	5720	0.4	3180	2500	6710	0.4	3640	2730	5480	0.4	3060	2440	6390	0.4	3480	2650
20-#14	21	5600	0.5	2650	2080	6540	0.5	3040	2280	5360	0.5	2550	2040	6220	0.5	2900	2210
6x-6y	25	5450	0.7	1590	1250	6340	0.7	1820	1370	5220	0.7	1530	1220	6030	0.7	1740	1330
	40	4740	0.9	529	416	5380	0.9	607	455	4520	0.9	509	407	5090	0.9	579	442
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2610	2060	10.80	9.60	2610	2060	10.80	9.60	2430	1920	10.80	9.60	2430	1920	10.80	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 36

Designation		W 14 x257								W 14 x233							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	4170	0.0	2260	1790	5070	0.0	2830	2080	3970	0.0	2110	1710	4780	0.0	2620	1980
Ar(in²)	11	4120	0.2	2040	1610	4990	0.2	2540	1880	3910	0.2	1900	1540	4700	0.2	2360	1780
= 6.24	13	4090	0.3	1780	1410	4960	0.3	2220	1640	3890	0.3	1660	1350	4670	0.3	2060	1560
	17	4040	0.4	1530	1210	4870	0.4	1910	1410	3830	0.4	1430	1150	4590	0.4	1770	1340
4-#11	21	3970	0.5	1270	1010	4770	0.5	1590	1170	3770	0.5	1190	961	4490	0.5	1470	1120
2x-2y	25	3890	0.7	764	603	4650	0.7	953	703	3690	0.7	713	576	4380	0.7	883	669
	40	3470	0.9	254	201	4060	0.9	317	234	3290	0.9	237	192	3810	0.9	294	223
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2270	1790	10.80	9.60	2270	1790	10.80	9.60	2110	1670	10.80	9.60	2110	1670	10.80	9.60
1.04 %	0	4370	0.0	2620	2070	5270	0.0	3180	2370	4160	0.0	2470	1990	4980	0.0	2970	2270
Ar(in²)	11	4310	0.2	2360	1870	5180	0.2	2860	2130	4100	0.2	2220	1790	4890	0.2	2680	2040
=12.00	13	4280	0.3	2060	1630	5140	0.3	2500	1860	4080	0.3	1950	1570	4860	0.3	2340	1780
	17	4220	0.4	1770	1400	5050	0.4	2150	1600	4020	0.4	1670	1340	4770	0.4	2010	1530
12-# 9	21	4140	0.5	1470	1170	4940	0.5	1790	1330	3940	0.5	1390	1120	4670	0.5	1670	1270
4x-4y	25	4050	0.7	884	699	4810	0.7	1070	798	3860	0.7	833	672	4540	0.7	1000	764
	40	3610	0.9	294	233	4180	0.9	357	266	3420	0.9	277	224	3930	0.9	334	254
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2270	1790	10.80	9.60	2270	1790	10.80	9.60	2110	1660	10.80	9.60	2110	1660	10.80	9.60
2.08 %	0	4780	0.0	3170	2650	5680	0.0	3720	2950	4570	0.0	3020	2570	5390	0.0	3520	2840
Ar(in²)	11	4700	0.2	2850	2390	5570	0.2	3350	2650	4500	0.2	2720	2320	5290	0.2	3170	2560
=24.00	13	4680	0.3	2500	2090	5530	0.3	2930	2320	4470	0.3	2380	2030	5250	0.3	2770	2240
	17	4600	0.4	2140	1790	5430	0.4	2510	1990	4400	0.4	2040	1740	5150	0.4	2380	1920
24-# 9	21	4510	0.5	1780	1490	5300	0.5	2100	1660	4310	0.5	1700	1450	5020	0.5	1980	1600
6x-8y	25	4400	0.7	1070	895	5150	0.7	1260	994	4200	0.7	1020	868	4880	0.7	1190	960
	40	3870	0.9	356	298	4420	0.9	419	331	3680	0.9	339	289	4170	0.9	396	320
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2260	1790	10.80	9.60	2260	1790	10.80	9.60	2100	1660	10.80	9.60	2100	1660	10.80	9.60
3.13 %	0	5190	0.0	4100	3010	6090	0.0	4660	3300	4980	0.0	3950	2930	5800	0.0	4450	3200
Ar(in²)	11	5100	0.2	3690	2710	5970	0.2	4190	2970	4900	0.2	3550	2640	5680	0.2	4010	2880
=36.00	13	5070	0.3	3230	2370	5920	0.3	3670	2600	4860	0.3	3110	2310	5630	0.3	3510	2520
	17	4980	0.4	2770	2030	5800	0.4	3140	2230	4770	0.4	2660	1980	5520	0.4	3000	2160
16-#14	21	4870	0.5	2300	1690	5650	0.5	2620	1860	4670	0.5	2220	1650	5370	0.5	2500	1800
6x-4y	25	4750	0.7	1380	1020	5480	0.7	1570	1120	4540	0.7	1330	990	5210	0.7	1500	1080
	40	4130	0.9	460	338	4650	0.9	523	371	3930	0.9	444	330	4400	0.9	500	360
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2260	1780	10.80	9.60	2260	1780	10.80	9.60	2090	1650	10.80	9.60	2090	1650	10.80	9.60
3.91 %	0	5500	0.0	4370	3540	6400	0.0	4930	3830	5290	0.0	4220	3460	6110	0.0	4720	3730
Ar(in²)	11	5400	0.2	3930	3180	6260	0.2	4440	3440	5190	0.2	3800	3110	5970	0.2	4250	3350
=45.00	13	5360	0.3	3440	2780	6210	0.3	3880	3010	5150	0.3	3320	2720	5920	0.3	3720	2940
	17	5260	0.4	2950	2390	6080	0.4	3330	2580	5060	0.4	2850	2330	5790	0.4	3190	2520
20-#14	21	5140	0.5	2460	1990	5920	0.5	2770	2150	4940	0.5	2370	1940	5640	0.5	2660	2100
6x-6y	25	5000	0.7	1470	1190	5730	0.7	1660	1290	4790	0.7	1420	1170	5450	0.7	1590	1260
	40	4310	0.9	491	397	4820	0.9	554	430	4110	0.9	474	388	4560	0.9	531	419
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2250	1780	10.80	9.60	2250	1780	10.80	9.60	2090	1650	10.80	9.60	2090	1650	10.80	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 32 x 36

Designation		W 14 x211								W 14 x193							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	3780	0.0	1980	1630	4520	0.0	2430	1890	3630	0.0	1870	1570	4300	0.0	2290	1810
Ar(in²)	11	3720	0.2	1780	1470	4440	0.2	2190	1700	3570	0.2	1690	1420	4230	0.2	2060	1630
= 6.24	13	3700	0.3	1560	1290	4410	0.3	1920	1490	3550	0.3	1480	1240	4200	0.3	1800	1430
	17	3650	0.4	1340	1100	4330	0.4	1640	1270	3500	0.4	1260	1060	4130	0.4	1540	1220
4-#11	21	3580	0.5	1110	919	4240	0.5	1370	1060	3440	0.5	1050	884	4040	0.5	1290	1020
2x-2y	25	3510	0.7	668	551	4130	0.7	820	637	3360	0.7	632	530	3930	0.7	771	612
	40	3120	0.9	222	183	3590	0.9	273	212	2980	0.9	210	176	3410	0.9	257	204
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1960	1550	10.80	9.60	1960	1550	10.80	9.60	1840	1460	10.80	9.60	1840	1460	10.80	9.60
1.04 %	0	3970	0.0	2340	1920	4710	0.0	2790	2170	3820	0.0	2230	1860	4500	0.0	2640	2100
Ar(in²)	11	3910	0.2	2100	1730	4630	0.2	2510	1950	3760	0.2	2010	1670	4420	0.2	2380	1890
=12.00	13	3890	0.3	1840	1510	4590	0.3	2200	1710	3740	0.3	1760	1460	4390	0.3	2080	1650
	17	3830	0.4	1580	1290	4510	0.4	1880	1470	3680	0.4	1510	1250	4310	0.4	1780	1420
12-# 9	21	3760	0.5	1310	1080	4410	0.5	1570	1220	3610	0.5	1250	1040	4210	0.5	1490	1180
4x-4y	25	3670	0.7	788	647	4290	0.7	941	732	3530	0.7	752	626	4090	0.7	891	707
	40	3250	0.9	262	215	3710	0.9	313	244	3110	0.9	250	208	3530	0.9	297	235
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1960	1550	10.80	9.60	1960	1550	10.80	9.60	1840	1450	10.80	9.60	1840	1450	10.80	9.60
2.08 %	0	4380	0.0	2890	2500	5120	0.0	3340	2750	4230	0.0	2780	2440	4910	0.0	3190	2680
Ar(in²)	11	4310	0.2	2600	2250	5020	0.2	3010	2480	4160	0.2	2510	2190	4810	0.2	2870	2410
=24.00	13	4280	0.3	2270	1970	4980	0.3	2630	2170	4130	0.3	2190	1920	4770	0.3	2510	2110
	17	4210	0.4	1950	1690	4890	0.4	2250	1860	4060	0.4	1880	1650	4680	0.4	2160	1810
24-# 9	21	4120	0.5	1620	1410	4770	0.5	1880	1550	3970	0.5	1570	1370	4560	0.5	1800	1510
6x-8y	25	4020	0.7	974	843	4630	0.7	1130	928	3870	0.7	939	822	4420	0.7	1080	903
	40	3510	0.9	324	281	3940	0.9	375	309	3360	0.9	313	274	3760	0.9	359	301
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1950	1540	10.80	9.60	1950	1540	10.80	9.60	1830	1450	10.80	9.60	1830	1450	10.80	9.60
3.13 %	0	4800	0.0	3810	2860	5530	0.0	4270	3110	4640	0.0	3710	2800	5320	0.0	4120	3040
Ar(in²)	11	4710	0.2	3430	2570	5420	0.2	3840	2800	4560	0.2	3340	2520	5200	0.2	3710	2730
=36.00	13	4670	0.3	3000	2250	5370	0.3	3360	2450	4520	0.3	2920	2200	5160	0.3	3240	2390
	17	4590	0.4	2570	1930	5260	0.4	2880	2100	4440	0.4	2500	1890	5050	0.4	2780	2050
16-#14	21	4480	0.5	2140	1610	5120	0.5	2400	1750	4330	0.5	2090	1570	4910	0.5	2320	1710
6x-4y	25	4360	0.7	1290	964	4950	0.7	1440	1050	4210	0.7	1250	944	4750	0.7	1390	1020
	40	3750	0.9	428	321	4170	0.9	479	349	3610	0.9	417	314	3980	0.9	463	341
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1950	1540	10.80	9.60	1950	1540	10.80	9.60	1830	1450	10.80	9.60	1830	1450	10.80	9.60
3.91 %	0	5100	0.0	4080	3380	5840	0.0	4540	3630	4950	0.0	3980	3320	5630	0.0	4390	3560
Ar(in²)	11	5000	0.2	3680	3040	5710	0.2	4080	3270	4850	0.2	3580	2990	5500	0.2	3950	3200
=45.00	13	4960	0.3	3220	2660	5660	0.3	3570	2860	4810	0.3	3130	2620	5450	0.3	3460	2800
	17	4870	0.4	2760	2280	5530	0.4	3060	2450	4720	0.4	2690	2240	5320	0.4	2960	2400
20-#14	21	4750	0.5	2300	1900	5380	0.5	2550	2040	4600	0.5	2240	1870	5170	0.5	2470	2000
6x-6y	25	4610	0.7	1380	1140	5190	0.7	1530	1230	4450	0.7	1340	1120	4990	0.7	1480	1200
	40	3930	0.9	459	380	4330	0.9	510	408	3780	0.9	447	373	4140	0.9	493	400
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1940	1530	10.80	9.60	1940	1530	10.80	9.60	1820	1440	10.80	9.60	1820	1440	10.80	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 36

Designation		W 14 x176								W 14 x159							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.54 %	0	3480	0.0	1770	1510	4100	0.0	2150	1740	3330	0.0	1670	1450	3890	0.0	2010	1660
Ar(in²)	11	3430	0.2	1600	1360	4030	0.2	1930	1560	3280	0.2	1510	1300	3820	0.2	1810	1490
= 6.24	13	3410	0.3	1400	1190	4000	0.3	1690	1370	3260	0.3	1320	1140	3790	0.3	1580	1310
	17	3360	0.4	1200	1020	3930	0.4	1450	1170	3210	0.4	1130	975	3720	0.4	1360	1120
4-#11	21	3290	0.5	997	849	3840	0.5	1210	977	3150	0.5	940	813	3640	0.5	1130	933
2x-2y	25	3220	0.7	598	509	3740	0.7	724	586	3080	0.7	564	487	3540	0.7	677	560
	40	2850	0.9	199	169	3240	0.9	241	195	2710	0.9	188	162	3060	0.9	225	186
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1730	1370	10.80	9.60	1730	1370	10.80	9.60	1610	1280	10.80	9.60	1610	1280	10.80	9.60
1.04 %	0	3680	0.0	2130	1790	4290	0.0	2500	2020	3530	0.0	2030	1730	4090	0.0	2360	1940
Ar(in²)	11	3620	0.2	1920	1610	4220	0.2	2250	1820	3470	0.2	1830	1560	4010	0.2	2130	1750
=12.00	13	3600	0.3	1680	1410	4180	0.3	1970	1590	3450	0.3	1600	1360	3980	0.3	1860	1530
	17	3540	0.4	1440	1210	4110	0.4	1690	1360	3390	0.4	1370	1170	3900	0.4	1600	1310
12-# 9	21	3470	0.5	1200	1010	4010	0.5	1410	1140	3320	0.5	1140	973	3810	0.5	1330	1090
4x-4y	25	3390	0.7	718	605	3900	0.7	844	681	3240	0.7	684	583	3700	0.7	798	655
	40	2970	0.9	239	201	3350	0.9	281	227	2840	0.9	228	194	3170	0.9	266	218
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1730	1360	10.80	9.60	1730	1360	10.80	9.60	1610	1270	10.80	9.60	1610	1270	10.80	9.60
2.08 %	0	4090	0.0	2680	2380	4700	0.0	3050	2600	3940	0.0	2580	2310	4500	0.0	2920	2520
Ar(in²)	11	4020	0.2	2410	2140	4610	0.2	2750	2340	3870	0.2	2320	2080	4400	0.2	2620	2270
=24.00	13	3990	0.3	2110	1870	4570	0.3	2400	2050	3840	0.3	2030	1820	4370	0.3	2300	1990
	17	3920	0.4	1810	1600	4480	0.4	2060	1760	3770	0.4	1740	1560	4270	0.4	1970	1700
24-# 9	21	3830	0.5	1510	1340	4360	0.5	1720	1460	3680	0.5	1450	1300	4160	0.5	1640	1420
6x-8y	25	3730	0.7	905	801	4230	0.7	1030	877	3580	0.7	871	780	4030	0.7	984	852
	40	3230	0.9	301	267	3580	0.9	343	292	3080	0.9	290	260	3400	0.9	328	284
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1720	1360	10.80	9.60	1720	1360	10.80	9.60	1610	1270	10.80	9.60	1610	1270	10.80	9.60
3.13 %	0	4500	0.0	3610	2740	5110	0.0	3980	2960	4350	0.0	3510	2670	4910	0.0	3840	2880
Ar(in²)	11	4410	0.2	3250	2460	5000	0.2	3580	2670	4260	0.2	3160	2410	4790	0.2	3460	2600
=36.00	13	4380	0.3	2840	2160	4960	0.3	3130	2330	4230	0.3	2760	2110	4750	0.3	3030	2270
	17	4290	0.4	2430	1850	4850	0.4	2690	2000	4140	0.4	2370	1810	4640	0.4	2590	1950
16-#14	21	4190	0.5	2030	1540	4710	0.5	2240	1670	4040	0.5	1970	1500	4510	0.5	2160	1620
6x-4y	25	4060	0.7	1220	924	4550	0.7	1340	999	3910	0.7	1180	902	4350	0.7	1300	973
	40	3460	0.9	405	308	3800	0.9	447	333	3320	0.9	394	300	3610	0.9	432	324
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1720	1360	10.80	9.60	1720	1360	10.80	9.60	1600	1260	10.80	9.60	1600	1260	10.80	9.60
3.91 %	0	4810	0.0	3880	3260	5420	0.0	4250	3480	4660	0.0	3780	3200	5210	0.0	4110	3410
Ar(in²)	11	4710	0.2	3490	2940	5290	0.2	3830	3140	4560	0.2	3400	2880	5090	0.2	3700	3070
=45.00	13	4670	0.3	3050	2570	5240	0.3	3350	2740	4520	0.3	2970	2520	5040	0.3	3240	2680
	17	4570	0.4	2620	2200	5120	0.4	2870	2350	4420	0.4	2550	2160	4920	0.4	2780	2300
20-#14	21	4450	0.5	2180	1840	4970	0.5	2390	1960	4300	0.5	2120	1800	4770	0.5	2310	1920
6x-6y	25	4310	0.7	1310	1100	4790	0.7	1430	1180	4160	0.7	1270	1080	4590	0.7	1390	1150
	40	3630	0.9	436	367	3950	0.9	478	392	3480	0.9	424	359	3760	0.9	462	383
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1710	1350	10.80	9.60	1710	1350	10.80	9.60	1600	1260	10.80	9.60	1600	1260	10.80	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 36

Designation		W 12 x336								W 12 x305							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.54 %	0	4850	0.0	2650	1890	6020	0.0	3340	2190	4580	0.0	2460	1810	5650	0.0	3080	2080
Ar(in²)	11	4780	0.2	2390	1700	5930	0.2	3010	1970	4520	0.2	2220	1630	5550	0.2	2770	1880
= 6.24	13	4760	0.3	2090	1490	5890	0.3	2630	1730	4500	0.3	1940	1420	5520	0.3	2430	1640
	17	4700	0.4	1790	1280	5790	0.4	2250	1480	4440	0.4	1660	1220	5430	0.4	2080	1410
4-#11	21	4620	0.5	1490	1060	5680	0.5	1880	1230	4360	0.5	1390	1020	5320	0.5	1730	1170
2x-2y	25	4530	0.7	895	638	5540	0.7	1130	739	4280	0.7	831	610	5190	0.7	1040	703
	40	4080	0.9	298	212	4860	0.9	375	246	3840	0.9	277	203	4540	0.9	346	234
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2800	2210	10.80	9.60	2800	2210	10.80	9.60	2590	2040	10.80	9.60	2590	2040	10.80	9.60
1.04 %	0	5040	0.0	3010	2170	6220	0.0	3700	2470	4780	0.0	2820	2090	5840	0.0	3440	2370
Ar(in²)	11	4980	0.2	2710	1960	6120	0.2	3330	2230	4710	0.2	2540	1880	5740	0.2	3090	2130
=12.00	13	4950	0.3	2370	1710	6080	0.3	2910	1950	4690	0.3	2220	1650	5710	0.3	2710	1860
	17	4880	0.4	2030	1470	5980	0.4	2490	1670	4620	0.4	1900	1410	5610	0.4	2320	1600
12-# 9	21	4800	0.5	1690	1220	5850	0.5	2080	1390	4540	0.5	1590	1180	5490	0.5	1930	1330
4x-4y	25	4700	0.7	1020	733	5700	0.7	1250	835	4450	0.7	951	705	5350	0.7	1160	798
	40	4210	0.9	338	244	4980	0.9	415	278	3970	0.9	317	235	4660	0.9	386	266
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2790	2210	10.80	9.60	2790	2210	10.80	9.60	2590	2040	10.80	9.60	2590	2040	10.80	9.60
2.08 %	0	5450	0.0	3540	2750	6630	0.0	4220	3050	5190	0.0	3350	2670	6250	0.0	3960	2940
Ar(in²)	11	5370	0.2	3190	2480	6510	0.2	3790	2750	5110	0.2	3020	2400	6140	0.2	3560	2650
=24.00	13	5340	0.3	2790	2170	6470	0.3	3320	2400	5080	0.3	2640	2100	6100	0.3	3120	2320
	17	5270	0.4	2390	1860	6350	0.4	2850	2060	5000	0.4	2260	1800	5990	0.4	2670	1990
24-# 9	21	5170	0.5	1990	1550	6210	0.5	2370	1720	4910	0.5	1890	1500	5850	0.5	2230	1660
6x-8y	25	5050	0.7	1190	928	6040	0.7	1420	1030	4800	0.7	1130	901	5690	0.7	1340	993
	40	4490	0.9	398	309	5230	0.9	474	343	4240	0.9	377	300	4910	0.9	445	331
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2790	2200	10.80	9.60	2790	2200	10.80	9.60	2580	2040	10.80	9.60	2580	2040	10.80	9.60
3.13 %	0	5860	0.0	4480	3110	7040	0.0	5170	3410	5600	0.0	4290	3030	6660	0.0	4910	3300
Ar(in²)	11	5770	0.2	4030	2800	6910	0.2	4650	3070	5510	0.2	3870	2730	6530	0.2	4420	2970
=36.00	13	5740	0.3	3530	2450	6860	0.3	4070	2690	5470	0.3	3380	2390	6480	0.3	3870	2600
	17	5650	0.4	3030	2100	6730	0.4	3490	2300	5380	0.4	2900	2050	6360	0.4	3320	2230
16-#14	21	5530	0.5	2520	1750	6570	0.5	2910	1920	5270	0.5	2420	1700	6210	0.5	2760	1860
6x-4y	25	5400	0.7	1510	1050	6380	0.7	1740	1150	5140	0.7	1450	1020	6020	0.7	1660	1110
	40	4750	0.9	504	350	5470	0.9	581	383	4510	0.9	483	340	5150	0.9	552	371
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2780	2200	10.80	9.60	2780	2200	10.80	9.60	2570	2030	10.80	9.60	2570	2030	10.80	9.60
3.91 %	0	6170	0.0	4750	3630	7350	0.0	5440	3930	5900	0.0	4570	3550	6970	0.0	5180	3820
Ar(in²)	11	6070	0.2	4280	3270	7200	0.2	4900	3540	5800	0.2	4110	3200	6830	0.2	4660	3440
=45.00	13	6030	0.3	3740	2860	7150	0.3	4280	3100	5760	0.3	3600	2800	6770	0.3	4080	3010
	17	5930	0.4	3210	2450	7010	0.4	3670	2650	5670	0.4	3080	2400	6640	0.4	3500	2580
20-#14	21	5810	0.5	2670	2040	6830	0.5	3060	2210	5540	0.5	2570	2000	6470	0.5	2910	2150
6x-6y	25	5660	0.7	1600	1230	6630	0.7	1840	1330	5400	0.7	1540	1200	6270	0.7	1750	1290
	40	4950	0.9	534	408	5640	0.9	611	442	4700	0.9	513	399	5320	0.9	582	430
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2780	2190	10.80	9.60	2780	2190	10.80	9.60	2570	2030	10.80	9.60	2570	2030	10.80	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 32 x 36

Designation		W 12 x279								W 12 x252							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.54 %	0	4360	0.0	2310	1740	5330	0.0	2860	1990	4130	0.0	2150	1670	5010	0.0	2650	1900
Ar(in²)	11	4300	0.2	2080	1560	5240	0.2	2570	1790	4070	0.2	1940	1500	4930	0.2	2380	1710
= 6.24	13	4270	0.3	1820	1370	5210	0.3	2250	1570	4050	0.3	1690	1310	4890	0.3	2080	1500
	17	4220	0.4	1560	1170	5120	0.4	1930	1340	3990	0.4	1450	1120	4810	0.4	1790	1280
4-#11	21	4150	0.5	1300	977	5020	0.5	1610	1120	3930	0.5	1210	937	4710	0.5	1490	1070
2x-2y	25	4060	0.7	778	586	4890	0.7	965	672	3840	0.7	726	562	4590	0.7	893	641
	40	3640	0.9	259	195	4280	0.9	321	224	3440	0.9	242	187	4010	0.9	297	213
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2410	1910	10.80	9.60	2410	1910	10.80	9.60	2240	1770	10.80	9.60	2240	1770	10.80	9.60
1.04 %	0	4550	0.0	2660	2020	5530	0.0	3220	2270	4330	0.0	2510	1950	5210	0.0	3000	2180
Ar(in²)	11	4490	0.2	2400	1820	5430	0.2	2890	2050	4260	0.2	2260	1750	5120	0.2	2700	1970
=12.00	13	4460	0.3	2100	1590	5400	0.3	2530	1790	4240	0.3	1970	1530	5080	0.3	2360	1720
	17	4400	0.4	1800	1360	5300	0.4	2170	1540	4180	0.4	1690	1320	4990	0.4	2030	1470
12-# 9	21	4320	0.5	1500	1140	5190	0.5	1810	1280	4100	0.5	1410	1100	4890	0.5	1690	1230
4x-4y	25	4230	0.7	898	682	5060	0.7	1090	767	4010	0.7	846	657	4760	0.7	1010	736
	40	3770	0.9	299	227	4400	0.9	361	255	3570	0.9	282	219	4130	0.9	337	245
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2410	1900	10.80	9.60	2410	1900	10.80	9.60	2230	1760	10.80	9.60	2230	1760	10.80	9.60
2.08 %	0	4960	0.0	3200	2600	5940	0.0	3740	2850	4740	0.0	3040	2530	5620	0.0	3530	2760
Ar(in²)	11	4890	0.2	2880	2340	5830	0.2	3370	2570	4660	0.2	2740	2280	5510	0.2	3180	2490
=24.00	13	4860	0.3	2520	2050	5790	0.3	2950	2250	4630	0.3	2400	1990	5470	0.3	2780	2180
	17	4780	0.4	2160	1760	5680	0.4	2530	1930	4560	0.4	2050	1710	5370	0.4	2380	1860
24-# 9	21	4690	0.5	1800	1460	5550	0.5	2110	1600	4470	0.5	1710	1420	5240	0.5	1990	1550
6x-8y	25	4580	0.7	1080	877	5390	0.7	1260	962	4360	0.7	1030	853	5090	0.7	1190	932
	40	4040	0.9	359	292	4640	0.9	421	320	3830	0.9	342	284	4370	0.9	397	310
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2400	1900	10.80	9.60	2400	1900	10.80	9.60	2230	1760	10.80	9.60	2230	1760	10.80	9.60
3.13 %	0	5370	0.0	4140	2960	6350	0.0	4690	3210	5150	0.0	3980	2890	6030	0.0	4480	3120
Ar(in²)	11	5280	0.2	3720	2660	6220	0.2	4220	2890	5060	0.2	3580	2600	5910	0.2	4030	2810
=36.00	13	5250	0.3	3260	2330	6170	0.3	3690	2530	5020	0.3	3140	2270	5860	0.3	3530	2460
	17	5160	0.4	2790	2000	6050	0.4	3170	2170	4940	0.4	2690	1950	5740	0.4	3020	2110
16-#14	21	5050	0.5	2330	1660	5900	0.5	2640	1810	4830	0.5	2240	1620	5600	0.5	2520	1760
6x-4y	25	4920	0.7	1400	998	5730	0.7	1580	1080	4700	0.7	1340	974	5420	0.7	1510	1050
	40	4300	0.9	465	332	4880	0.9	527	361	4090	0.9	447	324	4600	0.9	503	351
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2400	1900	10.80	9.60	2400	1900	10.80	9.60	2220	1760	10.80	9.60	2220	1760	10.80	9.60
3.91 %	0	5680	0.0	4410	3480	6660	0.0	4960	3730	5450	0.0	4250	3410	6340	0.0	4750	3640
Ar(in²)	11	5580	0.2	3970	3130	6520	0.2	4470	3360	5350	0.2	3830	3070	6200	0.2	4270	3280
=45.00	13	5540	0.3	3470	2740	6460	0.3	3910	2940	5310	0.3	3350	2690	6150	0.3	3740	2870
	17	5440	0.4	2980	2350	6330	0.4	3350	2520	5220	0.4	2870	2300	6020	0.4	3210	2460
20-#14	21	5320	0.5	2480	1960	6170	0.5	2790	2100	5100	0.5	2390	1920	5860	0.5	2670	2050
6x-6y	25	5180	0.7	1490	1180	5970	0.7	1670	1260	4960	0.7	1440	1150	5670	0.7	1600	1230
	40	4480	0.9	495	391	5040	0.9	558	420	4270	0.9	478	383	4770	0.9	534	409
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2390	1890	10.80	9.60	2390	1890	10.80	9.60	2220	1750	10.80	9.60	2220	1750	10.80	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 32 x 36

Designation		W 12 x230								W 12 x210							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.54 %	0	3940	0.0	2030	1610	4750	0.0	2480	1830	3770	0.0	1910	1550	4510	0.0	2320	1760
Ar(in²)	11	3890	0.2	1830	1450	4670	0.2	2230	1640	3720	0.2	1720	1390	4430	0.2	2090	1580
= 6.24	13	3870	0.3	1600	1260	4640	0.3	1950	1440	3700	0.3	1510	1220	4400	0.3	1830	1380
	17	3810	0.4	1370	1080	4560	0.4	1670	1230	3640	0.4	1290	1050	4320	0.4	1570	1190
4-#11	21	3740	0.5	1140	903	4460	0.5	1390	1030	3580	0.5	1080	871	4230	0.5	1310	987
2x-2y	25	3660	0.7	684	542	4350	0.7	836	616	3500	0.7	646	522	4120	0.7	783	592
	40	3270	0.9	228	180	3790	0.9	278	205	3110	0.9	215	174	3580	0.9	261	197
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2090	1650	10.80	9.60	2090	1650	10.80	9.60	1960	1550	10.80	9.60	1960	1550	10.80	9.60
1.04 %	0	4140	0.0	2380	1890	4950	0.0	2830	2110	3970	0.0	2270	1830	4700	0.0	2680	2040
Ar(in²)	11	4080	0.2	2150	1700	4860	0.2	2550	1900	3910	0.2	2040	1650	4620	0.2	2410	1830
=12.00	13	4060	0.3	1880	1490	4820	0.3	2230	1660	3890	0.3	1790	1440	4590	0.3	2110	1610
	17	4000	0.4	1610	1280	4740	0.4	1910	1420	3830	0.4	1530	1240	4500	0.4	1810	1380
12-# 9	21	3920	0.5	1340	1060	4630	0.5	1590	1190	3750	0.5	1280	1030	4400	0.5	1510	1150
4x-4y	25	3830	0.7	804	637	4510	0.7	956	711	3670	0.7	766	618	4280	0.7	903	688
	40	3400	0.9	268	212	3910	0.9	318	237	3240	0.9	255	206	3700	0.9	301	229
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2090	1650	10.80	9.60	2090	1650	10.80	9.60	1950	1540	10.80	9.60	1950	1540	10.80	9.60
2.08 %	0	4550	0.0	2920	2470	5360	0.0	3370	2690	4380	0.0	2810	2410	5110	0.0	3210	2620
Ar(in²)	11	4480	0.2	2630	2220	5250	0.2	3030	2420	4310	0.2	2530	2170	5010	0.2	2890	2360
=24.00	13	4450	0.3	2300	1940	5210	0.3	2650	2120	4280	0.3	2210	1900	4980	0.3	2530	2060
	17	4380	0.4	1970	1670	5110	0.4	2270	1810	4210	0.4	1900	1630	4880	0.4	2170	1770
24-# 9	21	4290	0.5	1640	1390	4990	0.5	1890	1510	4120	0.5	1580	1360	4760	0.5	1810	1470
6x-8y	25	4180	0.7	985	833	4850	0.7	1140	907	4010	0.7	948	814	4620	0.7	1080	883
	40	3660	0.9	328	277	4140	0.9	378	302	3500	0.9	316	271	3940	0.9	361	294
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2080	1650	10.80	9.60	2080	1650	10.80	9.60	1950	1540	10.80	9.60	1950	1540	10.80	9.60
3.13 %	0	4960	0.0	3860	2830	5770	0.0	4310	3050	4790	0.0	3750	2770	5520	0.0	4150	2980
Ar(in²)	11	4870	0.2	3470	2550	5650	0.2	3880	2740	4700	0.2	3370	2500	5410	0.2	3740	2680
=36.00	13	4840	0.3	3040	2230	5600	0.3	3390	2400	4670	0.3	2950	2180	5360	0.3	3270	2340
	17	4750	0.4	2610	1910	5490	0.4	2910	2060	4580	0.4	2530	1870	5250	0.4	2800	2010
16-#14	21	4650	0.5	2170	1590	5340	0.5	2420	1710	4480	0.5	2110	1560	5110	0.5	2340	1670
6x-4y	25	4520	0.7	1300	954	5180	0.7	1450	1030	4350	0.7	1260	935	4950	0.7	1400	1000
	40	3910	0.9	434	318	4370	0.9	484	342	3750	0.9	421	311	4160	0.9	467	334
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2080	1640	10.80	9.60	2080	1640	10.80	9.60	1940	1530	10.80	9.60	1940	1530	10.80	9.60
3.91 %	0	5270	0.0	4130	3350	6070	0.0	4580	3570	5100	0.0	4020	3300	5830	0.0	4420	3500
Ar(in²)	11	5170	0.2	3720	3020	5940	0.2	4120	3210	5000	0.2	3620	2970	5700	0.2	3980	3150
=45.00	13	5130	0.3	3250	2640	5890	0.3	3610	2810	4960	0.3	3160	2600	5650	0.3	3480	2760
	17	5030	0.4	2790	2260	5760	0.4	3090	2410	4860	0.4	2710	2230	5520	0.4	2990	2360
20-#14	21	4910	0.5	2320	1890	5600	0.5	2580	2010	4740	0.5	2260	1850	5370	0.5	2490	1970
6x-6y	25	4770	0.7	1390	1130	5420	0.7	1550	1200	4600	0.7	1360	1110	5190	0.7	1490	1180
	40	4090	0.9	464	377	4530	0.9	515	401	3920	0.9	451	370	4320	0.9	497	393
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2070	1640	10.80	9.60	2070	1640	10.80	9.60	1940	1530	10.80	9.60	1940	1530	10.80	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) — Column Size(b x h): 32 x 36

Designation		W 12 x190								W 12 x170							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.54 %	0	3600	0.0	1800	1490	4260	0.0	2170	1680	3430	0.0	1700	1430	4020	0.0	2020	1610
Ar(in²)	11	3540	0.2	1620	1340	4190	0.2	1950	1520	3380	0.2	1530	1290	3950	0.2	1820	1450
= 6.24	13	3520	0.3	1420	1170	4160	0.3	1710	1330	3360	0.3	1330	1130	3920	0.3	1590	1270
	17	3470	0.4	1220	1010	4090	0.4	1460	1140	3310	0.4	1140	964	3860	0.4	1360	1090
4-#11	21	3410	0.5	1010	837	4000	0.5	1220	947	3240	0.5	953	803	3770	0.5	1140	906
2x-2y	25	3330	0.7	608	502	3890	0.7	732	568	3170	0.7	572	482	3670	0.7	681	543
	40	2950	0.9	202	167	3370	0.9	244	189	2800	0.9	190	160	3170	0.9	227	181
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1820	1440	10.80	9.60	1820	1440	10.80	9.60	1690	1330	10.80	9.60	1690	1330	10.80	9.60
1.04 %	0	3790	0.0	2160	1770	4460	0.0	2520	1970	3630	0.0	2050	1710	4220	0.0	2380	1890
Ar(in²)	11	3740	0.2	1940	1600	4380	0.2	2270	1770	3570	0.2	1850	1540	4140	0.2	2140	1700
=12.00	13	3710	0.3	1700	1400	4350	0.3	1990	1550	3540	0.3	1620	1350	4110	0.3	1870	1490
	17	3650	0.4	1460	1200	4270	0.4	1700	1330	3490	0.4	1380	1160	4040	0.4	1600	1280
12-# 9	21	3580	0.5	1210	997	4170	0.5	1420	1110	3420	0.5	1150	963	3940	0.5	1340	1070
4x-4y	25	3500	0.7	728	598	4050	0.7	851	663	3330	0.7	692	577	3830	0.7	801	639
	40	3080	0.9	242	199	3490	0.9	283	221	2930	0.9	230	192	3290	0.9	267	213
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1820	1440	10.80	9.60	1820	1440	10.80	9.60	1690	1330	10.80	9.60	1690	1330	10.80	9.60
2.08 %	0	4200	0.0	2700	2350	4870	0.0	3060	2550	4040	0.0	2590	2290	4630	0.0	2910	2470
Ar(in²)	11	4130	0.2	2430	2120	4770	0.2	2750	2290	3960	0.2	2330	2060	4540	0.2	2620	2230
=24.00	13	4100	0.3	2130	1850	4730	0.3	2410	2010	3940	0.3	2040	1810	4500	0.3	2290	1950
	17	4030	0.4	1820	1590	4640	0.4	2070	1720	3870	0.4	1750	1550	4410	0.4	1970	1670
24-# 9	21	3940	0.5	1520	1320	4520	0.5	1720	1430	3780	0.5	1460	1290	4290	0.5	1640	1390
6x-8y	25	3840	0.7	910	794	4380	0.7	1030	859	3680	0.7	874	774	4160	0.7	982	835
	40	3340	0.9	303	264	3720	0.9	344	286	3180	0.9	291	258	3520	0.9	327	278
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1810	1430	10.80	9.60	1810	1430	10.80	9.60	1680	1330	10.80	9.60	1680	1330	10.80	9.60
3.13 %	0	4610	0.0	3640	2710	5280	0.0	4000	2910	4450	0.0	3530	2660	5040	0.0	3850	2830
Ar(in²)	11	4530	0.2	3270	2440	5160	0.2	3600	2620	4360	0.2	3170	2390	4930	0.2	3470	2550
=36.00	13	4490	0.3	2860	2140	5120	0.3	3150	2290	4320	0.3	2780	2090	4880	0.3	3030	2230
	17	4410	0.4	2450	1830	5010	0.4	2700	1960	4240	0.4	2380	1790	4780	0.4	2600	1910
16-#14	21	4300	0.5	2040	1530	4870	0.5	2250	1630	4130	0.5	1980	1490	4640	0.5	2170	1590
6x-4y	25	4180	0.7	1230	916	4710	0.7	1350	980	4010	0.7	1190	896	4480	0.7	1300	956
	40	3580	0.9	408	305	3940	0.9	449	326	3410	0.9	396	298	3730	0.9	433	318
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1810	1430	10.80	9.60	1810	1430	10.80	9.60	1670	1320	10.80	9.60	1670	1320	10.80	9.60
3.91 %	0	4920	0.0	3910	3240	5590	0.0	4270	3430	4750	0.0	3800	3180	5350	0.0	4120	3360
Ar(in²)	11	4820	0.2	3520	2910	5460	0.2	3840	3090	4650	0.2	3420	2860	5220	0.2	3710	3020
=45.00	13	4780	0.3	3080	2550	5410	0.3	3360	2700	4610	0.3	2990	2500	5170	0.3	3250	2640
	17	4690	0.4	2640	2190	5280	0.4	2880	2310	4520	0.4	2560	2150	5050	0.4	2780	2270
20-#14	21	4570	0.5	2200	1820	5130	0.5	2400	1930	4400	0.5	2140	1790	4900	0.5	2320	1890
6x-6y	25	4430	0.7	1320	1090	4950	0.7	1440	1160	4250	0.7	1280	1070	4720	0.7	1390	1130
	40	3750	0.9	439	364	4100	0.9	480	385	3580	0.9	427	357	3890	0.9	463	377
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1800	1420	10.80	9.60	1800	1420	10.80	9.60	1670	1320	10.80	9.60	1670	1320	10.80	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) — Column Size(b x h): 32 x 32

Designation		W 14 x426								W 14 x398							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	5370	0.0	3110	2170	6860	0.0	4060	2630	5140	0.0	2920	2080	6530	0.0	3800	2510
Ar(in²)	11	5310	0.2	2800	1950	6760	0.2	3650	2370	5080	0.2	2630	1870	6430	0.2	3420	2260
= 5.08	13	5280	0.3	2450	1710	6710	0.3	3200	2070	5050	0.3	2300	1640	6390	0.3	3000	1980
	17	5220	0.4	2100	1460	6610	0.4	2740	1780	4990	0.4	1970	1400	6290	0.4	2570	1700
4-#10	21	5140	0.5	1750	1220	6480	0.5	2280	1480	4920	0.5	1640	1170	6170	0.5	2140	1410
2x-2y	25	5050	0.7	1050	731	6330	0.7	1370	888	4820	0.7	985	702	6030	0.7	1280	847
	40	4580	0.9	349	243	5590	0.9	456	296	4370	0.9	328	234	5310	0.9	427	282
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2630	2630	9.60	9.60	2630	2630	9.60	9.60	2490	2490	9.60	9.60	2490	2490	9.60	9.60
.99 %	0	5550	0.0	3410	2370	7040	0.0	4360	2840	5320	0.0	3220	2280	6710	0.0	4110	2720
Ar(in²)	11	5480	0.2	3070	2130	6920	0.2	3930	2550	5250	0.2	2900	2060	6600	0.2	3700	2440
=10.16	13	5450	0.3	2690	1870	6880	0.3	3440	2230	5220	0.3	2540	1800	6560	0.3	3240	2140
	17	5380	0.4	2300	1600	6770	0.4	2950	1910	5160	0.4	2180	1540	6450	0.4	2770	1830
8-#10	21	5300	0.5	1920	1330	6640	0.5	2460	1600	5070	0.5	1810	1280	6330	0.5	2310	1530
4x-2y	25	5200	0.7	1150	800	6480	0.7	1470	957	4980	0.7	1090	770	6170	0.7	1390	916
	40	4700	0.9	383	266	5700	0.9	491	319	4490	0.9	362	256	5420	0.9	462	305
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2630	2630	9.60	9.60	2630	2630	9.60	9.60	2490	2490	9.60	9.60	2490	2490	9.60	9.60
1.98 %	0	5890	0.0	3950	2780	7380	0.0	4900	3240	5660	0.0	3760	2690	7050	0.0	4640	3120
Ar(in²)	11	5820	0.2	3550	2500	7260	0.2	4410	2920	5590	0.2	3390	2420	6940	0.2	4180	2810
=20.32	13	5790	0.3	3110	2190	7210	0.3	3860	2550	5560	0.3	2960	2120	6890	0.3	3660	2460
	17	5710	0.4	2670	1870	7090	0.4	3310	2190	5480	0.4	2540	1820	6770	0.4	3140	2110
16-#10	21	5610	0.5	2220	1560	6950	0.5	2760	1820	5390	0.5	2120	1510	6630	0.5	2610	1760
6x-4y	25	5500	0.7	1330	936	6770	0.7	1650	1090	5280	0.7	1270	907	6460	0.7	1570	1050
	40	4940	0.9	444	312	5920	0.9	551	364	4730	0.9	423	302	5640	0.9	522	351
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2630	2630	9.60	9.60	2630	2630	9.60	9.60	2480	2480	9.60	9.60	2480	2480	9.60	9.60
3.05 %	0	6270	0.0	4360	3400	7750	0.0	5310	3870	6030	0.0	4170	3320	7430	0.0	5050	3750
Ar(in²)	11	6180	0.2	3920	3060	7620	0.2	4780	3480	5950	0.2	3750	2990	7290	0.2	4540	3370
=31.20	13	6140	0.3	3430	2680	7570	0.3	4180	3050	5910	0.3	3280	2610	7240	0.3	3980	2950
	17	6060	0.4	2940	2300	7430	0.4	3580	2610	5830	0.4	2810	2240	7120	0.4	3410	2530
20-#11	21	5950	0.5	2450	1910	7270	0.5	2980	2180	5720	0.5	2340	1870	6960	0.5	2840	2110
6x-6y	25	5820	0.7	1470	1150	7080	0.7	1790	1310	5600	0.7	1410	1120	6770	0.7	1700	1270
	40	5190	0.9	489	382	6140	0.9	596	435	4980	0.9	468	373	5860	0.9	568	421
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2620	2620	9.60	9.60	2620	2620	9.60	9.60	2480	2480	9.60	9.60	2480	2480	9.60	9.60
4.39 %	0	6740	0.0	4930	3970	8230	0.0	5880	4440	6510	0.0	4740	3890	7900	0.0	5620	4320
Ar(in²)	11	6640	0.2	4440	3580	8070	0.2	5290	3990	6400	0.2	4270	3500	7750	0.2	5060	3880
=45.00	13	6600	0.3	3880	3130	8010	0.3	4630	3490	6360	0.3	3730	3060	7690	0.3	4430	3400
	17	6500	0.4	3330	2680	7870	0.4	3970	3000	6270	0.4	3200	2620	7550	0.4	3800	2910
20-#14	21	6370	0.5	2770	2230	7680	0.5	3310	2500	6140	0.5	2670	2190	7370	0.5	3160	2430
6x-6y	25	6220	0.7	1660	1340	7470	0.7	1980	1500	6000	0.7	1600	1310	7160	0.7	1900	1460
	40	5500	0.9	554	446	6420	0.9	661	499	5290	0.9	533	437	6140	0.9	632	485
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2620	2620	9.60	9.60	2620	2620	9.60	9.60	2470	2470	9.60	9.60	2470	2470	9.60	9.60

Notes : 1. $Cex = Pex(KxLx)^2/10000.$ (kip-ft²), $Cey = Pey(KyLy)^2/10000.$ (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW

ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 32 x 32

Designation		W 14 x370								W 14 x342							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	4910	0.0	2740	2000	6210	0.0	3550	2400	4680	0.0	2550	1910	5880	0.0	3310	2280
Ar(in²)	11	4850	0.2	2460	1800	6110	0.2	3200	2160	4620	0.2	2300	1720	5790	0.2	2980	2050
= 5.08	13	4820	0.3	2160	1570	6070	0.3	2800	1890	4590	0.3	2010	1510	5750	0.3	2600	1790
	17	4760	0.4	1850	1350	5980	0.4	2400	1620	4540	0.4	1720	1290	5660	0.4	2230	1540
4-#10	21	4690	0.5	1540	1120	5860	0.5	2000	1350	4470	0.5	1440	1080	5550	0.5	1860	1280
2x-2y	25	4600	0.7	923	674	5720	0.7	1200	808	4380	0.7	862	645	5410	0.7	1120	768
	40	4160	0.9	307	224	5040	0.9	399	269	3960	0.9	287	215	4760	0.9	371	256
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2340	2340	9.60	9.60	2340	2340	9.60	9.60	2200	2200	9.60	9.60	2200	2200	9.60	9.60
.99 %	0	5080	0.0	3040	2200	6380	0.0	3860	2600	4850	0.0	2860	2120	6050	0.0	3610	2480
Ar(in²)	11	5020	0.2	2740	1980	6280	0.2	3470	2340	4790	0.2	2570	1900	5950	0.2	3250	2230
=10.16	13	4990	0.3	2400	1730	6240	0.3	3040	2050	4760	0.3	2250	1670	5910	0.3	2840	1950
	17	4930	0.4	2050	1480	6140	0.4	2600	1750	4700	0.4	1930	1430	5820	0.4	2440	1670
8-#10	21	4850	0.5	1710	1240	6010	0.5	2170	1460	4620	0.5	1610	1190	5700	0.5	2030	1400
4x-2y	25	4750	0.7	1030	742	5870	0.7	1300	876	4530	0.7	965	714	5560	0.7	1220	837
	40	4280	0.9	342	247	5150	0.9	434	292	4080	0.9	321	238	4870	0.9	406	279
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2340	2340	9.60	9.60	2340	2340	9.60	9.60	2200	2200	9.60	9.60	2200	2200	9.60	9.60
1.98 %	0	5430	0.0	3580	2610	6730	0.0	4400	3000	5200	0.0	3400	2520	6400	0.0	4150	2890
Ar(in²)	11	5360	0.2	3220	2340	6610	0.2	3960	2700	5120	0.2	3060	2270	6290	0.2	3730	2600
=20.32	13	5330	0.3	2820	2050	6570	0.3	3460	2370	5100	0.3	2680	1990	6250	0.3	3270	2270
	17	5250	0.4	2420	1760	6460	0.4	2970	2030	5020	0.4	2290	1700	6140	0.4	2800	1950
16-#10	21	5160	0.5	2010	1470	6320	0.5	2470	1690	4940	0.5	1910	1420	6010	0.5	2330	1620
6x-4y	25	5060	0.7	1210	879	6160	0.7	1480	1010	4830	0.7	1150	851	5850	0.7	1400	974
	40	4520	0.9	402	293	5360	0.9	494	337	4310	0.9	382	283	5090	0.9	466	324
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2340	2340	9.60	9.60	2340	2340	9.60	9.60	2190	2190	9.60	9.60	2190	2190	9.60	9.60
3.05 %	0	5800	0.0	3990	3230	7100	0.0	4800	3630	5570	0.0	3800	3150	6770	0.0	4550	3510
Ar(in²)	11	5720	0.2	3590	2910	6970	0.2	4320	3270	5490	0.2	3420	2830	6650	0.2	4100	3160
=31.20	13	5680	0.3	3140	2550	6920	0.3	3780	2860	5450	0.3	3000	2480	6600	0.3	3590	2770
	17	5600	0.4	2690	2180	6800	0.4	3240	2450	5370	0.4	2570	2130	6480	0.4	3070	2370
20-#11	21	5500	0.5	2240	1820	6640	0.5	2700	2040	5270	0.5	2140	1770	6330	0.5	2560	1980
6x-6y	25	5370	0.7	1350	1090	6460	0.7	1620	1230	5150	0.7	1280	1060	6160	0.7	1540	1190
	40	4770	0.9	448	363	5590	0.9	540	408	4560	0.9	428	354	5310	0.9	512	395
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2330	2330	9.60	9.60	2330	2330	9.60	9.60	2190	2190	9.60	9.60	2190	2190	9.60	9.60
4.39 %	0	6270	0.0	4560	3800	7570	0.0	5370	4200	6040	0.0	4390	3720	7240	0.0	5130	4080
Ar(in²)	11	6170	0.2	4110	3420	7420	0.2	4840	3780	5940	0.2	3950	3350	7100	0.2	4610	3670
=45.00	13	6130	0.3	3590	2990	7370	0.3	4230	3310	5900	0.3	3450	2930	7050	0.3	4040	3220
	17	6040	0.4	3080	2570	7230	0.4	3630	2830	5810	0.4	2960	2510	6910	0.4	3460	2760
20-#14	21	5920	0.5	2570	2140	7050	0.5	3020	2360	5690	0.5	2470	2090	6740	0.5	2880	2300
6x-6y	25	5770	0.7	1540	1280	6850	0.7	1810	1420	5550	0.7	1480	1250	6540	0.7	1730	1380
	40	5070	0.9	513	427	5860	0.9	604	472	4860	0.9	493	418	5580	0.9	576	459
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2330	2330	9.60	9.60	2330	2330	9.60	9.60	2190	2190	9.60	9.60	2190	2190	9.60	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 32

Designation		W 14 x311								W 14 x283							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	4400	0.0	2360	1820	5480	0.0	3040	2150	4160	0.0	2180	1730	5150	0.0	2800	2040
Ar(in²)	11	4340	0.2	2120	1640	5400	0.2	2730	1940	4110	0.2	1960	1560	5070	0.2	2520	1840
= 5.08	13	4320	0.3	1860	1430	5360	0.3	2390	1690	4090	0.3	1720	1370	5040	0.3	2200	1610
	17	4260	0.4	1590	1230	5280	0.4	2050	1450	4030	0.4	1470	1170	4960	0.4	1890	1380
4-#10	21	4200	0.5	1330	1020	5170	0.5	1710	1210	3970	0.5	1230	975	4860	0.5	1570	1150
2x-2y	25	4110	0.7	795	613	5050	0.7	1030	726	3890	0.7	735	585	4740	0.7	944	688
	40	3710	0.9	265	204	4430	0.9	341	242	3500	0.9	245	195	4150	0.9	314	229
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2030	2030	9.60	9.60	2030	2030	9.60	9.60	1880	1880	9.60	9.60	1880	1880	9.60	9.60
.99 %	0	4570	0.0	2660	2020	5660	0.0	3340	2360	4340	0.0	2480	1940	5330	0.0	3100	2240
Ar(in²)	11	4510	0.2	2390	1820	5570	0.2	3010	2120	4280	0.2	2240	1740	5240	0.2	2790	2020
=10.16	13	4490	0.3	2100	1590	5530	0.3	2630	1850	4250	0.3	1960	1530	5200	0.3	2440	1770
	17	4430	0.4	1800	1370	5440	0.4	2260	1590	4200	0.4	1680	1310	5120	0.4	2090	1510
8-#10	21	4350	0.5	1500	1140	5330	0.5	1880	1320	4120	0.5	1400	1090	5010	0.5	1750	1260
4x-2y	25	4260	0.7	898	682	5190	0.7	1130	794	4040	0.7	838	653	4880	0.7	1050	757
	40	3830	0.9	299	227	4540	0.9	375	264	3620	0.9	279	217	4260	0.9	349	252
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2030	2030	9.60	9.60	2030	2030	9.60	9.60	1880	1880	9.60	9.60	1880	1880	9.60	9.60
1.98 %	0	4920	0.0	3200	2430	6010	0.0	3880	2760	4680	0.0	3020	2340	5670	0.0	3640	2650
Ar(in²)	11	4850	0.2	2880	2190	5900	0.2	3490	2480	4610	0.2	2720	2110	5570	0.2	3280	2380
=20.32	13	4820	0.3	2520	1910	5860	0.3	3050	2170	4590	0.3	2380	1850	5530	0.3	2870	2090
	17	4750	0.4	2160	1640	5760	0.4	2620	1860	4520	0.4	2040	1580	5440	0.4	2460	1790
16-#10	21	4670	0.5	1800	1370	5630	0.5	2180	1550	4440	0.5	1700	1320	5310	0.5	2050	1490
6x-4y	25	4560	0.7	1080	819	5480	0.7	1310	931	4340	0.7	1020	790	5170	0.7	1230	894
	40	4060	0.9	359	273	4750	0.9	436	310	3850	0.9	340	263	4470	0.9	409	298
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2020	2020	9.60	9.60	2020	2020	9.60	9.60	1880	1880	9.60	9.60	1880	1880	9.60	9.60
3.05 %	0	5290	0.0	3610	3060	6380	0.0	4290	3390	5050	0.0	3430	2970	6050	0.0	4050	3280
Ar(in²)	11	5210	0.2	3250	2750	6260	0.2	3860	3050	4970	0.2	3090	2680	5930	0.2	3640	2950
=31.20	13	5180	0.3	2840	2410	6210	0.3	3370	2670	4940	0.3	2700	2340	5890	0.3	3190	2580
	17	5100	0.4	2430	2060	6100	0.4	2890	2290	4860	0.4	2320	2010	5770	0.4	2730	2210
20-#11	21	5000	0.5	2030	1720	5950	0.5	2410	1910	4770	0.5	1930	1670	5640	0.5	2280	1840
6x-6y	25	4880	0.7	1220	1030	5790	0.7	1450	1140	4650	0.7	1160	1000	5470	0.7	1370	1110
	40	4300	0.9	405	343	4970	0.9	482	381	4090	0.9	385	334	4690	0.9	455	368
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2020	2020	9.60	9.60	2020	2020	9.60	9.60	1870	1870	9.60	9.60	1870	1870	9.60	9.60
4.39 %	0	5760	0.0	4190	3630	6850	0.0	4860	3960	5530	0.0	4030	3540	6520	0.0	4620	3850
Ar(in²)	11	5660	0.2	3770	3260	6710	0.2	4370	3560	5430	0.2	3620	3190	6380	0.2	4160	3460
=45.00	13	5630	0.3	3300	2860	6660	0.3	3830	3120	5390	0.3	3170	2790	6330	0.3	3640	3030
	17	5530	0.4	2830	2450	6530	0.4	3280	2670	5300	0.4	2720	2390	6200	0.4	3120	2600
20-#14	21	5410	0.5	2360	2040	6360	0.5	2730	2230	5180	0.5	2260	1990	6040	0.5	2600	2160
6x-6y	25	5280	0.7	1420	1220	6170	0.7	1640	1340	5050	0.7	1360	1200	5850	0.7	1560	1300
	40	4600	0.9	471	407	5240	0.9	546	445	4380	0.9	452	398	4950	0.9	520	432
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2010	2010	9.60	9.60	2010	2010	9.60	9.60	1870	1870	9.60	9.60	1870	1870	9.60	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 32 x 32

Designation		W 14 x257								W 14 x233							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	3940	0.0	2020	1650	4840	0.0	2580	1940	3730	0.0	1870	1580	4550	0.0	2370	1840
Ar(in²)	11	3890	0.2	1820	1490	4760	0.2	2320	1740	3680	0.2	1680	1420	4470	0.2	2130	1660
= 5.08	13	3860	0.3	1590	1300	4730	0.3	2030	1530	3660	0.3	1470	1240	4440	0.3	1870	1450
	17	3810	0.4	1360	1120	4650	0.4	1740	1310	3610	0.4	1260	1060	4370	0.4	1600	1240
4-#10	21	3750	0.5	1140	929	4560	0.5	1450	1090	3550	0.5	1050	886	4280	0.5	1330	1030
2x-2y	25	3670	0.7	681	557	4440	0.7	869	653	3480	0.7	631	532	4170	0.7	800	620
	40	3300	0.9	227	185	3890	0.9	289	217	3110	0.9	210	177	3640	0.9	266	206
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1750	1750	9.60	9.60	1750	1750	9.60	9.60	1620	1620	9.60	9.60	1620	1620	9.60	9.60
.99 %	0	4110	0.0	2320	1860	5010	0.0	2880	2140	3910	0.0	2170	1780	4720	0.0	2680	2040
Ar(in²)	11	4050	0.2	2090	1670	4930	0.2	2590	1930	3850	0.2	1960	1600	4640	0.2	2410	1840
=10.16	13	4030	0.3	1830	1460	4890	0.3	2270	1690	3830	0.3	1710	1400	4610	0.3	2110	1610
	17	3980	0.4	1570	1250	4810	0.4	1950	1440	3770	0.4	1470	1200	4530	0.4	1810	1380
8-#10	21	3910	0.5	1310	1040	4710	0.5	1620	1200	3710	0.5	1220	1000	4430	0.5	1510	1150
4x-2y	25	3820	0.7	783	626	4590	0.7	972	722	3630	0.7	733	600	4310	0.7	903	689
	40	3410	0.9	261	208	4000	0.9	324	240	3230	0.9	244	200	3750	0.9	301	229
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1740	1740	9.60	9.60	1740	1740	9.60	9.60	1620	1620	9.60	9.60	1620	1620	9.60	9.60
1.98 %	0	4460	0.0	2860	2260	5360	0.0	3420	2550	4250	0.0	2710	2190	5070	0.0	3220	2450
Ar(in²)	11	4390	0.2	2580	2040	5260	0.2	3080	2290	4190	0.2	2440	1970	4970	0.2	2890	2200
=20.32	13	4360	0.3	2250	1780	5220	0.3	2690	2000	4160	0.3	2140	1720	4940	0.3	2530	1930
	17	4300	0.4	1930	1530	5130	0.4	2310	1720	4100	0.4	1830	1480	4850	0.4	2170	1650
16-#10	21	4220	0.5	1610	1270	5010	0.5	1920	1430	4020	0.5	1530	1230	4730	0.5	1810	1380
6x-4y	25	4120	0.7	965	763	4870	0.7	1150	859	3920	0.7	915	738	4600	0.7	1090	826
	40	3640	0.9	321	254	4200	0.9	384	286	3450	0.9	305	246	3960	0.9	361	275
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1740	1740	9.60	9.60	1740	1740	9.60	9.60	1610	1610	9.60	9.60	1610	1610	9.60	9.60
3.05 %	0	4830	0.0	3270	2890	5730	0.0	3830	3170	4620	0.0	3120	2820	5440	0.0	3620	3080
Ar(in²)	11	4750	0.2	2940	2600	5620	0.2	3440	2860	4550	0.2	2810	2530	5330	0.2	3260	2770
=31.20	13	4720	0.3	2570	2280	5570	0.3	3010	2500	4510	0.3	2460	2220	5290	0.3	2850	2420
	17	4640	0.4	2210	1950	5470	0.4	2580	2140	4440	0.4	2110	1900	5180	0.4	2440	2080
20-#11	21	4550	0.5	1840	1630	5330	0.5	2150	1790	4340	0.5	1760	1580	5050	0.5	2040	1730
6x-6y	25	4430	0.7	1100	976	5180	0.7	1290	1070	4230	0.7	1050	950	4900	0.7	1220	1040
	40	3880	0.9	367	325	4420	0.9	430	357	3690	0.9	351	316	4170	0.9	407	346
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1740	1740	9.60	9.60	1740	1740	9.60	9.60	1610	1610	9.60	9.60	1610	1610	9.60	9.60
4.39 %	0	5300	0.0	3870	3460	6200	0.0	4410	3740	5100	0.0	3730	3390	5910	0.0	4210	3650
Ar(in²)	11	5210	0.2	3480	3120	6070	0.2	3970	3370	5000	0.2	3360	3050	5780	0.2	3790	3280
=45.00	13	5170	0.3	3050	2730	6020	0.3	3470	2950	4960	0.3	2940	2670	5730	0.3	3310	2870
	17	5080	0.4	2610	2340	5890	0.4	2970	2530	4870	0.4	2520	2290	5610	0.4	2840	2460
20-#14	21	4960	0.5	2180	1950	5740	0.5	2480	2110	4760	0.5	2100	1900	5460	0.5	2370	2050
6x-6y	25	4820	0.7	1310	1170	5550	0.7	1490	1260	4620	0.7	1260	1140	5280	0.7	1420	1230
	40	4160	0.9	435	389	4680	0.9	495	421	3970	0.9	419	380	4420	0.9	473	410
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1730	1730	9.60	9.60	1730	1730	9.60	9.60	1600	1600	9.60	9.60	1600	1600	9.60	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 32 x 32

Designation		W 14 x211								W 14 x193							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	3540	0.0	1740	1500	4280	0.0	2190	1750	3390	0.0	1630	1450	4070	0.0	2040	1680
Ar(in²)	11	3490	0.2	1560	1350	4210	0.2	1970	1570	3340	0.2	1470	1300	4000	0.2	1840	1510
= 5.08	13	3470	0.3	1370	1180	4180	0.3	1720	1380	3320	0.3	1280	1140	3970	0.3	1610	1320
	17	3430	0.4	1170	1020	4110	0.4	1480	1180	3280	0.4	1100	976	3900	0.4	1380	1130
4-#10	21	3370	0.5	976	846	4020	0.5	1230	983	3220	0.5	917	813	3820	0.5	1150	942
2x-2y	25	3290	0.7	585	507	3920	0.7	737	590	3150	0.7	550	488	3720	0.7	689	565
	40	2940	0.9	195	169	3420	0.9	245	196	2810	0.9	183	162	3240	0.9	229	188
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1500	1500	9.60	9.60	1500	1500	9.60	9.60	1410	1410	9.60	9.60	1410	1410	9.60	9.60
.99 %	0	3720	0.0	2040	1710	4450	0.0	2490	1950	3570	0.0	1940	1650	4240	0.0	2350	1880
Ar(in²)	11	3660	0.2	1840	1540	4380	0.2	2240	1760	3510	0.2	1740	1480	4170	0.2	2110	1690
=10.16	13	3640	0.3	1610	1350	4350	0.3	1960	1540	3490	0.3	1520	1300	4140	0.3	1850	1480
	17	3590	0.4	1380	1150	4270	0.4	1680	1320	3440	0.4	1310	1110	4060	0.4	1580	1270
8-#10	21	3520	0.5	1150	960	4180	0.5	1400	1100	3370	0.5	1090	928	3970	0.5	1320	1060
4x-2y	25	3440	0.7	688	576	4060	0.7	840	658	3300	0.7	653	556	3870	0.7	791	634
	40	3060	0.9	229	192	3520	0.9	280	219	2920	0.9	217	185	3340	0.9	263	211
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1500	1500	9.60	9.60	1500	1500	9.60	9.60	1410	1410	9.60	9.60	1410	1410	9.60	9.60
1.98 %	0	4060	0.0	2580	2120	4800	0.0	3030	2360	3910	0.0	2470	2060	4590	0.0	2890	2290
Ar(in²)	11	4000	0.2	2320	1900	4710	0.2	2730	2120	3850	0.2	2230	1850	4500	0.2	2600	2060
=20.32	13	3970	0.3	2030	1670	4670	0.3	2390	1860	3820	0.3	1950	1620	4460	0.3	2270	1800
	17	3910	0.4	1740	1430	4590	0.4	2050	1590	3760	0.4	1670	1390	4380	0.4	1950	1540
16-#10	21	3830	0.5	1450	1190	4480	0.5	1700	1330	3680	0.5	1390	1160	4270	0.5	1620	1290
6x-4y	25	3740	0.7	870	713	4350	0.7	1020	795	3590	0.7	835	694	4150	0.7	973	771
	40	3280	0.9	290	237	3730	0.9	340	265	3140	0.9	278	231	3550	0.9	324	257
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1500	1500	9.60	9.60	1500	1500	9.60	9.60	1400	1400	9.60	9.60	1400	1400	9.60	9.60
3.05 %	0	4440	0.0	2990	2750	5170	0.0	3440	2990	4280	0.0	2890	2690	4960	0.0	3290	2910
Ar(in²)	11	4360	0.2	2690	2470	5070	0.2	3090	2690	4210	0.2	2600	2420	4860	0.2	2960	2620
=31.20	13	4330	0.3	2350	2160	5030	0.3	2710	2350	4180	0.3	2270	2120	4820	0.3	2590	2300
	17	4250	0.4	2020	1850	4920	0.4	2320	2020	4100	0.4	1950	1810	4720	0.4	2220	1970
20-#11	21	4160	0.5	1680	1540	4800	0.5	1930	1680	4010	0.5	1620	1510	4590	0.5	1850	1640
6x-6y	25	4050	0.7	1010	926	4650	0.7	1160	1010	3900	0.7	974	907	4450	0.7	1110	983
	40	3510	0.9	336	308	3940	0.9	386	335	3370	0.9	324	302	3750	0.9	370	327
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1490	1490	9.60	9.60	1490	1490	9.60	9.60	1400	1400	9.60	9.60	1400	1400	9.60	9.60
4.39 %	0	4910	0.0	3600	3320	5640	0.0	4030	3560	4760	0.0	3500	3260	5430	0.0	3890	3480
Ar(in²)	11	4810	0.2	3240	2980	5520	0.2	3630	3200	4660	0.2	3150	2930	5310	0.2	3500	3140
=45.00	13	4770	0.3	2840	2610	5470	0.3	3170	2800	4620	0.3	2760	2570	5260	0.3	3070	2740
	17	4680	0.4	2430	2240	5350	0.4	2720	2400	4530	0.4	2360	2200	5140	0.4	2630	2350
20-#14	21	4570	0.5	2030	1870	5200	0.5	2270	2000	4420	0.5	1970	1830	4990	0.5	2190	1960
6x-6y	25	4430	0.7	1220	1120	5020	0.7	1360	1200	4280	0.7	1180	1100	4820	0.7	1310	1180
	40	3780	0.9	405	373	4180	0.9	453	400	3630	0.9	394	366	3990	0.9	438	392
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1490	1490	9.60	9.60	1490	1490	9.60	9.60	1390	1390	9.60	9.60	1390	1390	9.60	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 32

Designation		W 14 x176								W 14 x159							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	3250	0.0	1530	1390	3860	0.0	1900	1600	3100	0.0	1430	1330	3650	0.0	1760	1530
Ar(in²)	11	3200	0.2	1380	1250	3800	0.2	1710	1440	3050	0.2	1290	1190	3590	0.2	1590	1380
= 5.08	13	3180	0.3	1200	1090	3770	0.3	1500	1260	3030	0.3	1130	1040	3560	0.3	1390	1200
	17	3130	0.4	1030	936	3700	0.4	1280	1080	2990	0.4	965	895	3500	0.4	1190	1030
4-#10	21	3080	0.5	860	780	3620	0.5	1070	901	2930	0.5	804	746	3420	0.5	992	860
2x-2y	25	3010	0.7	516	468	3530	0.7	641	540	2870	0.7	482	447	3330	0.7	595	516
	40	2670	0.9	172	156	3070	0.9	213	180	2540	0.9	160	149	2890	0.9	198	172
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1320	1320	9.60	9.60	1320	1320	9.60	9.60	1230	1230	9.60	9.60	1230	1230	9.60	9.60
.99 %	0	3420	0.0	1830	1590	4040	0.0	2210	1810	3270	0.0	1740	1530	3830	0.0	2070	1730
Ar(in²)	11	3370	0.2	1650	1430	3960	0.2	1990	1630	3220	0.2	1560	1380	3760	0.2	1860	1560
=10.16	13	3350	0.3	1440	1250	3930	0.3	1740	1420	3200	0.3	1370	1210	3730	0.3	1630	1360
	17	3300	0.4	1240	1070	3860	0.4	1490	1220	3150	0.4	1170	1030	3660	0.4	1400	1170
8-#10	21	3230	0.5	1030	895	3780	0.5	1240	1020	3090	0.5	976	860	3580	0.5	1160	974
4x-2y	25	3160	0.7	619	537	3670	0.7	744	609	3010	0.7	585	516	3480	0.7	698	584
	40	2790	0.9	206	179	3170	0.9	248	203	2650	0.9	195	172	2990	0.9	232	194
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1320	1320	9.60	9.60	1320	1320	9.60	9.60	1220	1220	9.60	9.60	1220	1220	9.60	9.60
1.98 %	0	3770	0.0	2370	2000	4380	0.0	2750	2210	3620	0.0	2270	1940	4170	0.0	2610	2140
Ar(in²)	11	3700	0.2	2140	1800	4300	0.2	2470	1990	3560	0.2	2050	1750	4090	0.2	2350	1930
=20.32	13	3680	0.3	1870	1570	4260	0.3	2160	1740	3530	0.3	1790	1530	4060	0.3	2050	1690
	17	3620	0.4	1600	1350	4180	0.4	1850	1490	3470	0.4	1540	1310	3980	0.4	1760	1440
16-#10	21	3540	0.5	1340	1120	4080	0.5	1540	1240	3390	0.5	1280	1090	3880	0.5	1470	1200
6x-4y	25	3450	0.7	801	674	3960	0.7	926	746	3300	0.7	767	654	3760	0.7	880	722
	40	3000	0.9	267	224	3370	0.9	308	248	2870	0.9	255	218	3190	0.9	293	240
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1310	1310	9.60	9.60	1310	1310	9.60	9.60	1220	1220	9.60	9.60	1220	1220	9.60	9.60
3.05 %	0	4140	0.0	2790	2630	4760	0.0	3150	2840	3990	0.0	2690	2570	4550	0.0	3020	2770
Ar(in²)	11	4060	0.2	2510	2370	4650	0.2	2840	2560	3910	0.2	2420	2310	4450	0.2	2720	2490
=31.20	13	4030	0.3	2190	2070	4610	0.3	2480	2240	3880	0.3	2120	2020	4410	0.3	2380	2180
	17	3960	0.4	1880	1780	4520	0.4	2130	1920	3810	0.4	1810	1730	4310	0.4	2040	1870
20-#11	21	3860	0.5	1570	1480	4390	0.5	1770	1600	3720	0.5	1510	1450	4190	0.5	1700	1560
6x-6y	25	3750	0.7	940	887	4250	0.7	1060	959	3610	0.7	907	867	4050	0.7	1020	934
	40	3230	0.9	313	295	3570	0.9	354	319	3080	0.9	302	289	3390	0.9	339	311
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1310	1310	9.60	9.60	1310	1310	9.60	9.60	1220	1220	9.60	9.60	1220	1220	9.60	9.60
4.39 %	0	4610	0.0	3410	3200	5230	0.0	3760	3410	4460	0.0	3310	3140	5020	0.0	3630	3340
Ar(in²)	11	4510	0.2	3070	2880	5100	0.2	3380	3070	4370	0.2	2980	2830	4900	0.2	3270	3010
=45.00	13	4480	0.3	2680	2520	5060	0.3	2960	2690	4330	0.3	2610	2470	4850	0.3	2860	2630
	17	4380	0.4	2300	2160	4940	0.4	2540	2300	4230	0.4	2240	2120	4730	0.4	2450	2250
20-#14	21	4270	0.5	1920	1800	4790	0.5	2110	1920	4120	0.5	1860	1770	4590	0.5	2040	1880
6x-6y	25	4130	0.7	1150	1080	4620	0.7	1270	1150	3980	0.7	1120	1060	4420	0.7	1220	1130
	40	3490	0.9	383	360	3810	0.9	422	383	3340	0.9	372	353	3620	0.9	408	375
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1300	1300	9.60	9.60	1300	1300	9.60	9.60	1210	1210	9.60	9.60	1210	1210	9.60	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 32

Designation		W 12 x336								W 12 x305							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	4610	0.0	2400	1740	5790	0.0	3070	2040	4340	0.0	2210	1660	5410	0.0	2820	1930
Ar(in²)	11	4550	0.2	2160	1570	5700	0.2	2770	1840	4290	0.2	1990	1500	5320	0.2	2540	1740
= 5.08	13	4530	0.3	1890	1370	5660	0.3	2420	1610	4270	0.3	1740	1310	5290	0.3	2220	1520
	17	4470	0.4	1620	1180	5570	0.4	2080	1380	4210	0.4	1490	1120	5210	0.4	1900	1300
4-#10	21	4400	0.5	1350	980	5460	0.5	1730	1150	4140	0.5	1240	936	5100	0.5	1590	1090
2x-2y	25	4320	0.7	808	588	5330	0.7	1040	688	4060	0.7	745	561	4980	0.7	951	652
	40	3900	0.9	269	196	4690	0.9	345	229	3660	0.9	248	187	4370	0.9	317	217
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2160	2160	9.60	9.60	2160	2160	9.60	9.60	2000	2000	9.60	9.60	2000	2000	9.60	9.60
.99 %	0	4790	0.0	2700	1950	5960	0.0	3380	2240	4520	0.0	2510	1870	5580	0.0	3120	2140
Ar(in²)	11	4720	0.2	2430	1750	5860	0.2	3040	2020	4460	0.2	2260	1680	5490	0.2	2810	1920
=10.16	13	4700	0.3	2130	1530	5830	0.3	2660	1770	4430	0.3	1980	1470	5460	0.3	2460	1680
	17	4640	0.4	1820	1310	5730	0.4	2280	1510	4380	0.4	1700	1260	5370	0.4	2110	1440
8-#10	21	4560	0.5	1520	1090	5610	0.5	1900	1260	4300	0.5	1410	1050	5260	0.5	1760	1200
4x-2y	25	4470	0.7	911	656	5480	0.7	1140	757	4210	0.7	847	630	5120	0.7	1050	720
	40	4020	0.9	303	218	4800	0.9	380	252	3780	0.9	282	210	4480	0.9	351	240
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2160	2160	9.60	9.60	2160	2160	9.60	9.60	1990	1990	9.60	9.60	1990	1990	9.60	9.60
1.98 %	0	5130	0.0	3240	2350	6310	0.0	3910	2650	4870	0.0	3050	2270	5930	0.0	3660	2540
Ar(in²)	11	5060	0.2	2910	2120	6200	0.2	3520	2380	4800	0.2	2750	2050	5830	0.2	3290	2290
=20.32	13	5030	0.3	2550	1850	6160	0.3	3080	2090	4770	0.3	2400	1790	5790	0.3	2880	2000
	17	4960	0.4	2190	1590	6050	0.4	2640	1790	4700	0.4	2060	1530	5690	0.4	2470	1720
16-#10	21	4870	0.5	1820	1320	5920	0.5	2200	1490	4610	0.5	1720	1280	5560	0.5	2060	1430
6x-4y	25	4770	0.7	1090	793	5770	0.7	1320	894	4510	0.7	1030	767	5410	0.7	1240	857
	40	4260	0.9	364	264	5010	0.9	440	298	4010	0.9	343	255	4690	0.9	411	285
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2160	2160	9.60	9.60	2160	2160	9.60	9.60	1990	1990	9.60	9.60	1990	1990	9.60	9.60
3.05 %	0	5500	0.0	3640	2980	6680	0.0	4320	3280	5240	0.0	3460	2900	6300	0.0	4070	3170
Ar(in²)	11	5420	0.2	3280	2680	6560	0.2	3890	2950	5160	0.2	3110	2610	6190	0.2	3660	2850
=31.20	13	5390	0.3	2870	2350	6510	0.3	3400	2580	5120	0.3	2720	2290	6140	0.3	3200	2500
	17	5310	0.4	2460	2010	6390	0.4	2920	2210	5040	0.4	2330	1960	6030	0.4	2740	2140
20-#11	21	5210	0.5	2050	1680	6250	0.5	2430	1840	4950	0.5	1940	1630	5880	0.5	2290	1780
6x-6y	25	5090	0.7	1230	1010	6070	0.7	1460	1110	4830	0.7	1170	979	5720	0.7	1370	1070
	40	4500	0.9	409	335	5230	0.9	485	368	4260	0.9	388	326	4910	0.9	457	356
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2150	2150	9.60	9.60	2150	2150	9.60	9.60	1990	1990	9.60	9.60	1990	1990	9.60	9.60
4.39 %	0	5980	0.0	4220	3550	7150	0.0	4890	3850	5710	0.0	4040	3470	6780	0.0	4640	3740
Ar(in²)	11	5880	0.2	3800	3190	7010	0.2	4400	3460	5610	0.2	3630	3120	6640	0.2	4180	3360
=45.00	13	5840	0.3	3320	2790	6960	0.3	3850	3030	5570	0.3	3180	2730	6590	0.3	3650	2940
	17	5740	0.4	2850	2400	6820	0.4	3300	2600	5480	0.4	2730	2340	6450	0.4	3130	2520
20-#14	21	5630	0.5	2370	2000	6650	0.5	2750	2160	5360	0.5	2270	1950	6290	0.5	2610	2100
6x-6y	25	5490	0.7	1420	1200	6460	0.7	1650	1300	5220	0.7	1360	1170	6100	0.7	1570	1260
	40	4800	0.9	474	399	5500	0.9	550	432	4550	0.9	454	390	5170	0.9	521	420
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		2150	2150	9.60	9.60	2150	2150	9.60	9.60	1980	1980	9.60	9.60	1980	1980	9.60	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 32

Designation		W 12 x279								W 12 x252							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.50 %	0	4120	0.0	2050	1600	5100	0.0	2600	1840	3890	0.0	1900	1530	4780	0.0	2390	1750
Ar(in²)	11	4070	0.2	1850	1440	5010	0.2	2340	1660	3840	0.2	1710	1370	4700	0.2	2150	1580
= 5.08	13	4050	0.3	1610	1260	4980	0.3	2050	1450	3820	0.3	1490	1200	4670	0.3	1880	1380
	17	3990	0.4	1380	1080	4900	0.4	1760	1240	3770	0.4	1280	1030	4590	0.4	1610	1180
4-#10	21	3930	0.5	1150	897	4800	0.5	1460	1040	3710	0.5	1070	858	4500	0.5	1340	985
2x-2y	25	3850	0.7	691	538	4680	0.7	878	621	3630	0.7	639	515	4380	0.7	806	591
	40	3460	0.9	230	179	4110	0.9	292	207	3260	0.9	213	171	3840	0.9	268	197
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1860	1860	9.60	9.60	1860	1860	9.60	9.60	1720	1720	9.60	9.60	1720	1720	9.60	9.60
.99 %	0	4290	0.0	2350	1800	5270	0.0	2910	2040	4070	0.0	2200	1730	4950	0.0	2690	1960
Ar(in²)	11	4240	0.2	2120	1620	5180	0.2	2620	1840	4010	0.2	1980	1560	4870	0.2	2430	1760
=10.16	13	4210	0.3	1850	1420	5150	0.3	2290	1610	3990	0.3	1730	1360	4830	0.3	2120	1540
	17	4160	0.4	1590	1210	5060	0.4	1960	1380	3930	0.4	1490	1170	4750	0.4	1820	1320
8-#10	21	4080	0.5	1320	1010	4950	0.5	1640	1150	3860	0.5	1240	973	4650	0.5	1520	1100
4x-2y	25	4000	0.7	794	607	4830	0.7	981	689	3780	0.7	742	583	4530	0.7	909	659
	40	3580	0.9	264	202	4210	0.9	327	229	3380	0.9	247	194	3940	0.9	303	219
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1860	1860	9.60	9.60	1860	1860	9.60	9.60	1720	1720	9.60	9.60	1720	1720	9.60	9.60
1.98 %	0	4640	0.0	2890	2210	5620	0.0	3440	2450	4420	0.0	2740	2140	5300	0.0	3230	2360
Ar(in²)	11	4570	0.2	2600	1980	5520	0.2	3100	2200	4350	0.2	2460	1920	5200	0.2	2910	2120
=20.32	13	4550	0.3	2280	1740	5480	0.3	2710	1930	4320	0.3	2160	1680	5160	0.3	2550	1860
	17	4480	0.4	1950	1490	5380	0.4	2320	1650	4260	0.4	1850	1440	5070	0.4	2180	1590
16-#10	21	4400	0.5	1630	1240	5260	0.5	1940	1380	4170	0.5	1540	1200	4950	0.5	1820	1330
6x-4y	25	4300	0.7	976	744	5120	0.7	1160	826	4080	0.7	924	720	4820	0.7	1090	796
	40	3810	0.9	325	248	4420	0.9	387	275	3600	0.9	308	240	4150	0.9	363	265
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1850	1850	9.60	9.60	1850	1850	9.60	9.60	1710	1710	9.60	9.60	1710	1710	9.60	9.60
3.05 %	0	5010	0.0	3300	2830	5990	0.0	3850	3080	4790	0.0	3150	2770	5670	0.0	3640	2990
Ar(in²)	11	4930	0.2	2970	2550	5870	0.2	3470	2770	4710	0.2	2830	2490	5560	0.2	3270	2690
=31.20	13	4900	0.3	2600	2230	5830	0.3	3030	2420	4680	0.3	2480	2180	5510	0.3	2870	2350
	17	4820	0.4	2230	1910	5720	0.4	2600	2080	4600	0.4	2120	1870	5410	0.4	2460	2020
20-#11	21	4730	0.5	1860	1590	5580	0.5	2170	1730	4500	0.5	1770	1560	5270	0.5	2050	1680
6x-6y	25	4610	0.7	1110	956	5420	0.7	1300	1040	4390	0.7	1060	933	5120	0.7	1230	1010
	40	4050	0.9	371	318	4640	0.9	433	346	3840	0.9	353	311	4360	0.9	409	336
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1850	1850	9.60	9.60	1850	1850	9.60	9.60	1710	1710	9.60	9.60	1710	1710	9.60	9.60
4.39 %	0	5490	0.0	3880	3400	6460	0.0	4420	3650	5260	0.0	3730	3330	6140	0.0	4210	3560
Ar(in²)	11	5390	0.2	3500	3060	6330	0.2	3980	3280	5160	0.2	3360	3000	6010	0.2	3790	3200
=45.00	13	5350	0.3	3060	2680	6270	0.3	3480	2870	5130	0.3	2940	2630	5960	0.3	3320	2800
	17	5260	0.4	2620	2300	6150	0.4	2990	2460	5030	0.4	2520	2250	5830	0.4	2840	2400
20-#14	21	5140	0.5	2180	1910	5990	0.5	2490	2050	4920	0.5	2100	1880	5680	0.5	2370	2000
6x-6y	25	5010	0.7	1310	1150	5800	0.7	1490	1230	4780	0.7	1260	1130	5500	0.7	1420	1200
	40	4340	0.9	436	382	4900	0.9	497	410	4120	0.9	420	375	4620	0.9	474	400
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1840	1840	9.60	9.60	1840	1840	9.60	9.60	1700	1700	9.60	9.60	1700	1700	9.60	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) — Column Size(b x h): 32 x 32

Designation		W 12 x230								W 12 x210							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	3710	0.0	1770	1470	4510	0.0	2220	1680	3540	0.0	1660	1420	4270	0.0	2070	1610
Ar(in²)	11	3660	0.2	1600	1320	4440	0.2	2000	1510	3490	0.2	1500	1270	4200	0.2	1860	1450
= 5.08	13	3640	0.3	1400	1160	4410	0.3	1750	1320	3470	0.3	1310	1110	4170	0.3	1630	1270
	17	3590	0.4	1200	992	4340	0.4	1500	1130	3420	0.4	1120	955	4100	0.4	1390	1090
4-#10	21	3530	0.5	997	826	4250	0.5	1250	945	3360	0.5	934	796	4020	0.5	1160	907
2x-2y	25	3450	0.7	598	496	4140	0.7	749	567	3290	0.7	560	477	3910	0.7	697	544
	40	3090	0.9	199	165	3620	0.9	249	189	2940	0.9	186	159	3410	0.9	232	181
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1600	1600	9.60	9.60	1600	1600	9.60	9.60	1500	1500	9.60	9.60	1500	1500	9.60	9.60
.99 %	0	3880	0.0	2080	1670	4690	0.0	2530	1880	3710	0.0	1970	1620	4450	0.0	2370	1820
Ar(in²)	11	3830	0.2	1870	1510	4610	0.2	2270	1700	3660	0.2	1770	1460	4370	0.2	2130	1630
=10.16	13	3800	0.3	1640	1320	4570	0.3	1990	1480	3630	0.3	1550	1270	4340	0.3	1870	1430
	17	3750	0.4	1400	1130	4500	0.4	1700	1270	3580	0.4	1330	1090	4260	0.4	1600	1230
8-#10	21	3680	0.5	1170	941	4400	0.5	1420	1060	3520	0.5	1110	910	4170	0.5	1330	1020
4x-2y	25	3600	0.7	701	564	4280	0.7	852	635	3440	0.7	663	546	4060	0.7	800	612
	40	3210	0.9	233	188	3720	0.9	284	211	3050	0.9	221	182	3520	0.9	266	204
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1600	1600	9.60	9.60	1600	1600	9.60	9.60	1500	1500	9.60	9.60	1500	1500	9.60	9.60
1.98 %	0	4230	0.0	2620	2080	5030	0.0	3060	2290	4060	0.0	2510	2030	4790	0.0	2910	2220
Ar(in²)	11	4160	0.2	2360	1870	4940	0.2	2760	2060	3990	0.2	2250	1820	4700	0.2	2620	2000
=20.32	13	4140	0.3	2060	1640	4900	0.3	2410	1800	3970	0.3	1970	1600	4670	0.3	2290	1750
	17	4070	0.4	1770	1400	4810	0.4	2070	1550	3900	0.4	1690	1370	4580	0.4	1960	1500
16-#10	21	3990	0.5	1470	1170	4700	0.5	1720	1290	3820	0.5	1410	1140	4470	0.5	1640	1250
6x-4y	25	3900	0.7	883	701	4570	0.7	1030	772	3730	0.7	845	683	4340	0.7	981	749
	40	3430	0.9	294	233	3930	0.9	344	257	3270	0.9	281	227	3720	0.9	327	249
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1600	1600	9.60	9.60	1600	1600	9.60	9.60	1490	1490	9.60	9.60	1490	1490	9.60	9.60
3.05 %	0	4600	0.0	3020	2710	5410	0.0	3470	2920	4430	0.0	2910	2660	5160	0.0	3310	2850
Ar(in²)	11	4520	0.2	2720	2440	5300	0.2	3120	2630	4350	0.2	2620	2390	5060	0.2	2980	2560
=31.20	13	4490	0.3	2380	2130	5260	0.3	2730	2300	4320	0.3	2290	2090	5020	0.3	2610	2240
	17	4420	0.4	2040	1830	5150	0.4	2340	1970	4250	0.4	1970	1790	4920	0.4	2240	1920
20-#11	21	4320	0.5	1700	1520	5020	0.5	1950	1640	4150	0.5	1640	1490	4790	0.5	1860	1600
6x-6y	25	4210	0.7	1020	914	4870	0.7	1170	984	4040	0.7	982	896	4640	0.7	1120	961
	40	3660	0.9	340	304	4140	0.9	390	328	3500	0.9	327	298	3930	0.9	372	320
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1590	1590	9.60	9.60	1590	1590	9.60	9.60	1490	1490	9.60	9.60	1490	1490	9.60	9.60
4.39 %	0	5070	0.0	3620	3280	5880	0.0	4050	3490	4900	0.0	3510	3230	5640	0.0	3900	3420
Ar(in²)	11	4980	0.2	3250	2950	5750	0.2	3640	3140	4810	0.2	3160	2900	5510	0.2	3510	3080
=45.00	13	4940	0.3	2850	2580	5700	0.3	3190	2750	4770	0.3	2760	2540	5460	0.3	3070	2690
	17	4850	0.4	2440	2210	5580	0.4	2730	2350	4680	0.4	2370	2180	5340	0.4	2630	2310
20-#14	21	4730	0.5	2030	1840	5420	0.5	2280	1960	4560	0.5	1970	1810	5190	0.5	2190	1920
6x-6y	25	4600	0.7	1220	1110	5250	0.7	1370	1180	4430	0.7	1180	1090	5010	0.7	1320	1150
	40	3940	0.9	406	368	4390	0.9	455	392	3780	0.9	394	362	4180	0.9	438	384
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1590	1590	9.60	9.60	1590	1590	9.60	9.60	1480	1480	9.60	9.60	1480	1480	9.60	9.60

Notes : 1. $Cex = Pex(KxLx)^2/10000.$ (kip-ft²), $Cey = Pey(KyLy)^2/10000.$ (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 3.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 32

Designation		W 12 x190							
Fy (ksi)		36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	3360	0.0	1550	1360	4030	0.0	1910	1540
Ar(in²)	11	3310	0.2	1400	1220	3960	0.2	1720	1390
= 5.08	13	3300	0.3	1220	1070	3930	0.3	1510	1220
	17	3250	0.4	1050	917	3860	0.4	1290	1040
4-#10	21	3190	0.5	872	764	3780	0.5	1080	868
2x-2y	25	3120	0.7	523	458	3680	0.7	646	520
	40	2780	0.9	174	152	3200	0.9	215	173
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1390	1390	9.60	9.60	1390	1390	9.60	9.60
.99 %	0	3540	0.0	1860	1560	4200	0.0	2220	1750
Ar(in²)	11	3480	0.2	1670	1410	4120	0.2	2000	1570
=10.16	13	3460	0.3	1460	1230	4100	0.3	1750	1380
	17	3410	0.4	1250	1050	4020	0.4	1500	1180
8-#10	21	3350	0.5	1040	879	3930	0.5	1250	982
4x-2y	25	3270	0.7	626	527	3830	0.7	748	589
	40	2890	0.9	208	175	3310	0.9	249	196
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1390	1390	9.60	9.60	1390	1390	9.60	9.60
1.98 %	0	3880	0.0	2390	1970	4550	0.0	2760	2150
Ar(in²)	11	3820	0.2	2160	1770	4460	0.2	2480	1940
=20.32	13	3790	0.3	1890	1550	4420	0.3	2170	1700
	17	3730	0.4	1620	1330	4340	0.4	1860	1450
16-#10	21	3650	0.5	1350	1110	4230	0.5	1550	1210
6x-4y	25	3560	0.7	808	664	4110	0.7	930	726
	40	3110	0.9	269	221	3510	0.9	310	242
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1380	1380	9.60	9.60	1380	1380	9.60	9.60
3.05 %	0	4250	0.0	2800	2600	4920	0.0	3160	2780
Ar(in²)	11	4180	0.2	2520	2340	4820	0.2	2850	2500
=31.20	13	4150	0.3	2210	2050	4780	0.3	2490	2190
	17	4070	0.4	1890	1750	4680	0.4	2140	1880
20-#11	21	3980	0.5	1580	1460	4550	0.5	1780	1560
6x-6y	25	3870	0.7	945	877	4410	0.7	1070	938
	40	3340	0.9	315	292	3710	0.9	355	312
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1380	1380	9.60	9.60	1380	1380	9.60	9.60
4.39 %	0	4730	0.0	3400	3170	5390	0.0	3750	3350
Ar(in²)	11	4630	0.2	3060	2850	5270	0.2	3380	3020
=45.00	13	4590	0.3	2680	2500	5220	0.3	2950	2640
	17	4500	0.4	2300	2140	5100	0.4	2530	2260
20-#14	21	4390	0.5	1910	1780	4950	0.5	2110	1880
6x-6y	25	4250	0.7	1150	1070	4780	0.7	1270	1130
	40	3610	0.9	382	356	3960	0.9	421	376
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1370	1370	9.60	9.60	1370	1370	9.60	9.60

Designation		W 12 x170							
Fy (ksi)		36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	3190	0.0	1440	1300	3790	0.0	1770	1470
Ar(in²)	11	3150	0.2	1300	1170	3720	0.2	1590	1330
= 5.08	13	3130	0.3	1140	1030	3700	0.3	1390	1160
	17	3080	0.4	974	878	3630	0.4	1190	994
4-#10	21	3030	0.5	812	732	3550	0.5	993	829
2x-2y	25	2960	0.7	487	439	3460	0.7	596	497
	40	2630	0.9	162	146	3000	0.9	198	165
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1290	1290	9.60	9.60	1290	1290	9.60	9.60
.99 %	0	3370	0.0	1750	1510	3960	0.0	2070	1680
Ar(in²)	11	3320	0.2	1570	1360	3890	0.2	1860	1510
=10.16	13	3290	0.3	1380	1190	3860	0.3	1630	1320
	17	3240	0.4	1180	1020	3790	0.4	1400	1130
8-#10	21	3180	0.5	983	846	3710	0.5	1160	943
4x-2y	25	3110	0.7	590	508	3600	0.7	698	565
	40	2740	0.9	196	169	3110	0.9	232	188
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1280	1280	9.60	9.60	1280	1280	9.60	9.60
1.98 %	0	3710	0.0	2290	1910	4310	0.0	2610	2080
Ar(in²)	11	3650	0.2	2060	1720	4220	0.2	2350	1880
=20.32	13	3630	0.3	1800	1510	4190	0.3	2050	1640
	17	3560	0.4	1540	1290	4110	0.4	1760	1410
16-#10	21	3490	0.5	1290	1080	4010	0.5	1470	1170
6x-4y	25	3400	0.7	771	645	3890	0.7	880	703
	40	2960	0.9	257	215	3310	0.9	293	234
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1280	1280	9.60	9.60	1280	1280	9.60	9.60
3.05 %	0	4090	0.0	2690	2540	4680	0.0	3010	2710
Ar(in²)	11	4010	0.2	2420	2290	4580	0.2	2710	2440
=31.20	13	3980	0.3	2120	2000	4540	0.3	2370	2140
	17	3900	0.4	1820	1720	4440	0.4	2040	1830
20-#11	21	3810	0.5	1520	1430	4320	0.5	1700	1530
6x-6y	25	3700	0.7	909	858	4180	0.7	1020	915
	40	3180	0.9	303	286	3510	0.9	339	305
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1280	1280	9.60	9.60	1280	1280	9.60	9.60
4.39 %	0	4560	0.0	3300	3110	5150	0.0	3610	3280
Ar(in²)	11	4460	0.2	2970	2800	5030	0.2	3250	2950
=45.00	13	4420	0.3	2600	2450	4980	0.3	2840	2580
	17	4330	0.4	2230	2100	4860	0.4	2430	2220
20-#14	21	4220	0.5	1860	1750	4720	0.5	2030	1850
6x-6y	25	4080	0.7	1110	1050	4550	0.7	1220	1110
	40	3440	0.9	371	350	3740	0.9	405	369
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1270	1270	9.60	9.60	1270	1270	9.60	9.60

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 32 x 32

Designation		W 12 x152								W							
Fy (ksi)		36				50											
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy								
.50 %	0	3040	0.0	1350	1250	3570	0.0	1630	1410								
Ar(in²)	11	2990	0.2	1210	1120	3510	0.2	1470	1270								
= 5.08	13	2980	0.3	1060	982	3480	0.3	1290	1110								
	17	2930	0.4	910	842	3420	0.4	1100	951								
4-#10	21	2880	0.5	758	701	3350	0.5	919	792								
2x-2y	25	2810	0.7	455	421	3260	0.7	551	475								
	40	2490	0.9	151	140	2820	0.9	183	158								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1190	1190	9.60	9.60	1190	1190	9.60	9.60								
.99 %	0	3210	0.0	1650	1450	3750	0.0	1940	1610								
Ar(in²)	11	3160	0.2	1490	1310	3680	0.2	1750	1450								
=10.16	13	3140	0.3	1300	1140	3650	0.3	1530	1270								
	17	3090	0.4	1120	979	3580	0.4	1310	1090								
8-#10	21	3030	0.5	930	816	3500	0.5	1090	907								
4x-2y	25	2960	0.7	558	489	3400	0.7	654	544								
	40	2600	0.9	186	163	2920	0.9	218	181								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1190	1190	9.60	9.60	1190	1190	9.60	9.60								
1.98 %	0	3560	0.0	2190	1860	4090	0.0	2480	2020								
Ar(in²)	11	3500	0.2	1970	1670	4010	0.2	2230	1820								
=20.32	13	3470	0.3	1730	1470	3980	0.3	1950	1590								
	17	3410	0.4	1480	1260	3900	0.4	1670	1360								
16-#10	21	3340	0.5	1230	1050	3800	0.5	1390	1140								
6x-4y	25	3250	0.7	739	627	3680	0.7	836	681								
	40	2810	0.9	246	209	3120	0.9	278	227								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1190	1190	9.60	9.60	1190	1190	9.60	9.60								
3.05 %	0	3930	0.0	2600	2490	4460	0.0	2880	2650								
Ar(in²)	11	3860	0.2	2340	2240	4360	0.2	2600	2380								
=31.20	13	3820	0.3	2050	1960	4330	0.3	2270	2090								
	17	3750	0.4	1750	1680	4230	0.4	1950	1790								
20-#11	21	3660	0.5	1460	1400	4110	0.5	1620	1490								
6x-6y	25	3550	0.7	876	840	3970	0.7	973	893								
	40	3020	0.9	292	280	3310	0.9	324	297								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1180	1180	9.60	9.60	1180	1180	9.60	9.60								
4.39 %	0	4400	0.0	3210	3060	4940	0.0	3480	3220								
Ar(in²)	11	4310	0.2	2890	2760	4810	0.2	3130	2900								
=45.00	13	4270	0.3	2530	2410	4770	0.3	2740	2530								
	17	4180	0.4	2160	2070	4650	0.4	2350	2170								
20-#14	21	4060	0.5	1800	1720	4510	0.5	1960	1810								
6x-6y	25	3920	0.7	1080	1030	4340	0.7	1170	1090								
	40	3280	0.9	360	344	3550	0.9	391	362								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 21 in		1180	1180	9.60	9.60	1180	1180	9.60	9.60								

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 32

Designation		W 14 x426								W 14 x398							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.54 %	0	5170	0.0	3050	1910	6660	0.0	3990	2370	4940	0.0	2860	1820	6330	0.0	3740	2250
Ar(in²)	11	5090	0.2	2740	1720	6520	0.2	3590	2130	4860	0.2	2580	1640	6200	0.2	3370	2020
= 4.80	13	5060	0.3	2400	1500	6470	0.3	3150	1870	4830	0.3	2250	1430	6150	0.3	2940	1770
	17	4980	0.4	2060	1290	6340	0.4	2700	1600	4750	0.4	1930	1230	6030	0.4	2520	1520
8-# 7	21	4880	0.5	1720	1070	6190	0.5	2250	1330	4660	0.5	1610	1020	5880	0.5	2100	1270
4x-2y	25	4770	0.7	1030	643	6000	0.7	1350	799	4550	0.7	966	614	5700	0.7	1260	759
	40	4210	0.9	343	214	5110	0.9	449	266	4010	0.9	322	204	4850	0.9	420	253
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2580	1980	9.60	8.40	2580	1980	9.60	8.40	2440	1870	9.60	8.40	2440	1870	9.60	8.40
1.00 %	0	5310	0.0	3280	2140	6800	0.0	4230	2600	5080	0.0	3100	2050	6470	0.0	3970	2480
Ar(in²)	11	5230	0.2	2950	1920	6660	0.2	3810	2340	5000	0.2	2790	1850	6340	0.2	3580	2230
= 9.00	13	5190	0.3	2590	1680	6610	0.3	3330	2050	4970	0.3	2440	1620	6290	0.3	3130	1950
	17	5110	0.4	2220	1440	6470	0.4	2850	1750	4890	0.4	2090	1380	6160	0.4	2680	1670
4-#14	21	5010	0.5	1850	1200	6310	0.5	2380	1460	4790	0.5	1740	1150	6000	0.5	2230	1390
2x-2y	25	4890	0.7	1110	721	6120	0.7	1430	877	4670	0.7	1050	692	5820	0.7	1340	836
	40	4300	0.9	369	240	5180	0.9	475	292	4100	0.9	348	230	4920	0.9	446	278
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2580	1980	9.60	8.40	2580	1980	9.60	8.40	2440	1870	9.60	8.40	2440	1870	9.60	8.40
2.01 %	0	5620	0.0	3810	2410	7110	0.0	4750	2870	5390	0.0	3620	2330	6780	0.0	4500	2750
Ar(in²)	11	5530	0.2	3430	2170	6960	0.2	4280	2590	5300	0.2	3260	2090	6630	0.2	4050	2480
=18.00	13	5490	0.3	3000	1900	6900	0.3	3740	2260	5260	0.3	2850	1830	6580	0.3	3540	2170
	17	5400	0.4	2570	1630	6750	0.4	3210	1940	5170	0.4	2450	1570	6440	0.4	3040	1860
8-#14	21	5280	0.5	2140	1360	6570	0.5	2670	1620	5060	0.5	2040	1310	6260	0.5	2530	1550
4x-2y	25	5150	0.7	1290	814	6360	0.7	1600	970	4930	0.7	1220	784	6060	0.7	1520	929
	40	4490	0.9	428	271	5350	0.9	534	323	4290	0.9	407	261	5090	0.9	505	309
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2580	1970	9.60	8.40	2580	1970	9.60	8.40	2430	1860	9.60	8.40	2430	1860	9.60	8.40
2.79 %	0	5860	0.0	4130	2650	7350	0.0	5080	3110	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	5750	0.2	3720	2380	7180	0.2	4570	2800	0	0.2	0	0	0	0.2	0	0
=24.96	13	5710	0.3	3260	2080	7120	0.3	4000	2450	0	0.3	0	0	0	0.3	0	0
	17	5610	0.4	2790	1790	6970	0.4	3430	2100	0	0.4	0	0	0	0.4	0	0
16-#11	21	5490	0.5	2330	1490	6770	0.5	2860	1750	0	0.5	0	0	0	0.5	0	0
6x-4y	25	5350	0.7	1400	893	6550	0.7	1710	1050	0	0.7	0	0	0	0.7	0	0
	40	4630	0.9	465	297	5480	0.9	571	349	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2570	1970	9.60	8.40	2570	1970	9.60	8.40	0	0	.00	.00	0	0	.00	.00
3.57 %	0	6100	0.0	4590	2830	7590	0.0	5530	3290	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	5990	0.2	4130	2550	7410	0.2	4980	2960	0	0.2	0	0	0	0.2	0	0
=32.00	13	5940	0.3	3610	2230	7350	0.3	4350	2590	0	0.3	0	0	0	0.3	0	0
	17	5840	0.4	3100	1910	7180	0.4	3730	2220	0	0.4	0	0	0	0.4	0	0
8-#18	21	5700	0.5	2580	1590	6980	0.5	3110	1850	0	0.5	0	0	0	0.5	0	0
4x-2y	25	5540	0.7	1550	955	6740	0.7	1870	1110	0	0.7	0	0	0	0.7	0	0
	40	4780	0.9	515	318	5600	0.9	621	370	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2570	1970	9.60	8.40	2570	1970	9.60	8.40	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 32

Designation		W 14 x370								W 14 x342							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	4700	0.0	2680	1740	6000	0.0	3490	2130	4470	0.0	2500	1650	5670	0.0	3250	2020
Ar(in²)	11	4630	0.2	2410	1560	5880	0.2	3140	1920	4400	0.2	2250	1490	5560	0.2	2920	1810
= 4.80	13	4600	0.3	2110	1370	5830	0.3	2750	1680	4370	0.3	1970	1300	5510	0.3	2560	1590
	17	4530	0.4	1810	1170	5720	0.4	2360	1440	4300	0.4	1690	1120	5400	0.4	2190	1360
8-# 7	21	4440	0.5	1510	977	5570	0.5	1960	1200	4220	0.5	1410	930	5260	0.5	1830	1130
4x-2y	25	4330	0.7	905	586	5400	0.7	1180	719	4110	0.7	844	558	5100	0.7	1100	680
	40	3810	0.9	301	195	4590	0.9	392	239	3610	0.9	281	186	4330	0.9	365	226
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2300	1760	9.60	8.40	2300	1760	9.60	8.40	2150	1650	9.60	8.40	2150	1650	9.60	8.40
1.00 %	0	4850	0.0	2920	1970	6140	0.0	3730	2360	4610	0.0	2740	1880	5820	0.0	3480	2250
Ar(in²)	11	4770	0.2	2630	1770	6020	0.2	3350	2130	4540	0.2	2460	1700	5700	0.2	3130	2020
= 9.00	13	4740	0.3	2300	1550	5970	0.3	2930	1860	4510	0.3	2160	1480	5650	0.3	2740	1770
	17	4660	0.4	1970	1330	5850	0.4	2520	1590	4430	0.4	1850	1270	5530	0.4	2350	1520
4-#14	21	4570	0.5	1640	1110	5690	0.5	2100	1330	4340	0.5	1540	1060	5390	0.5	1960	1260
2x-2y	25	4450	0.7	984	663	5520	0.7	1260	797	4230	0.7	923	635	5220	0.7	1170	758
	40	3900	0.9	328	221	4660	0.9	419	265	3700	0.9	307	211	4400	0.9	391	252
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2290	1760	9.60	8.40	2290	1760	9.60	8.40	2150	1650	9.60	8.40	2150	1650	9.60	8.40
2.01 %	0	5150	0.0	3440	2240	6450	0.0	4250	2640	4920	0.0	3260	2160	6120	0.0	4000	2520
Ar(in²)	11	5070	0.2	3100	2020	6310	0.2	3830	2370	4830	0.2	2940	1940	5990	0.2	3600	2270
=18.00	13	5030	0.3	2710	1770	6260	0.3	3350	2080	4800	0.3	2570	1700	5940	0.3	3150	1990
	17	4940	0.4	2320	1510	6120	0.4	2870	1780	4720	0.4	2200	1460	5810	0.4	2700	1700
8-#14	21	4840	0.5	1940	1260	5960	0.5	2390	1480	4610	0.5	1840	1210	5650	0.5	2250	1420
4x-2y	25	4710	0.7	1160	756	5760	0.7	1430	890	4490	0.7	1100	728	5460	0.7	1350	850
	40	4090	0.9	387	252	4830	0.9	478	296	3890	0.9	367	242	4570	0.9	450	283
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2290	1750	9.60	8.40	2290	1750	9.60	8.40	2150	1640	9.60	8.40	2150	1640	9.60	8.40
3.01 %	0	5460	0.0	3800	2680	6760	0.0	4610	3080	5230	0.0	3620	2600	6430	0.0	4360	2960
Ar(in²)	11	5360	0.2	3420	2420	6610	0.2	4150	2770	5130	0.2	3260	2340	6280	0.2	3930	2670
=27.00	13	5320	0.3	2990	2110	6550	0.3	3630	2430	5090	0.3	2850	2050	6230	0.3	3440	2330
	17	5220	0.4	2570	1810	6400	0.4	3110	2080	5000	0.4	2440	1760	6080	0.4	2940	2000
12-#14	21	5100	0.5	2140	1510	6220	0.5	2590	1730	4880	0.5	2040	1460	5910	0.5	2450	1670
4x-4y	25	4960	0.7	1280	906	6000	0.7	1560	1040	4740	0.7	1220	877	5700	0.7	1470	1000
	40	4270	0.9	427	302	4990	0.9	518	346	4070	0.9	407	292	4720	0.9	490	333
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2290	1750	9.60	8.40	2290	1750	9.60	8.40	2140	1640	9.60	8.40	2140	1640	9.60	8.40
4.02 %	0	5770	0.0	3990	3130	7070	0.0	4800	3520	5540	0.0	3810	3040	6740	0.0	4550	3410
Ar(in²)	11	5660	0.2	3590	2810	6900	0.2	4320	3170	5430	0.2	3430	2740	6580	0.2	4100	3070
=36.00	13	5610	0.3	3140	2460	6830	0.3	3780	2770	5380	0.3	3000	2400	6510	0.3	3580	2680
	17	5500	0.4	2690	2110	6670	0.4	3240	2380	5280	0.4	2570	2050	6360	0.4	3070	2300
16-#14	21	5370	0.5	2240	1760	6470	0.5	2700	1980	5150	0.5	2140	1710	6160	0.5	2560	1920
4x-6y	25	5210	0.7	1350	1060	6240	0.7	1620	1190	4990	0.7	1290	1030	5940	0.7	1540	1150
	40	4450	0.9	448	351	5140	0.9	539	396	4240	0.9	428	342	4870	0.9	512	383
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2280	1750	9.60	8.40	2280	1750	9.60	8.40	2140	1640	9.60	8.40	2140	1640	9.60	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 28 x 32

Designation		W 14 x311								W 14 x283							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.54 %	0	4190	0.0	2310	1560	5280	0.0	2980	1890	3960	0.0	2130	1480	4950	0.0	2740	1780
Ar(in^2)	11	4120	0.2	2080	1410	5170	0.2	2680	1700	3890	0.2	1920	1330	4840	0.2	2470	1600
= 4.80	13	4100	0.3	1820	1230	5130	0.3	2350	1490	3860	0.3	1680	1170	4800	0.3	2160	1400
	17	4030	0.4	1560	1060	5020	0.4	2010	1280	3800	0.4	1440	1000	4710	0.4	1850	1200
8-# 7	21	3950	0.5	1300	879	4890	0.5	1680	1060	3720	0.5	1200	833	4580	0.5	1540	1000
4x-2y	25	3850	0.7	778	527	4740	0.7	1010	638	3630	0.7	719	500	4440	0.7	925	600
	40	3370	0.9	259	175	4010	0.9	335	212	3170	0.9	239	166	3750	0.9	308	200
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1980	1520	9.60	8.40	1980	1520	9.60	8.40	1830	1400	9.60	8.40	1830	1400	9.60	8.40
1.00 %	0	4340	0.0	2540	1790	5420	0.0	3210	2120	4100	0.0	2370	1710	5090	0.0	2980	2010
Ar(in^2)	11	4260	0.2	2290	1610	5310	0.2	2890	1910	4030	0.2	2130	1540	4980	0.2	2680	1810
= 9.00	13	4230	0.3	2000	1410	5260	0.3	2530	1670	4000	0.3	1860	1350	4940	0.3	2340	1580
	17	4160	0.4	1720	1210	5150	0.4	2170	1430	3930	0.4	1600	1160	4840	0.4	2010	1360
4-#14	21	4070	0.5	1430	1010	5020	0.5	1810	1190	3850	0.5	1330	962	4710	0.5	1670	1130
2x-2y	25	3970	0.7	857	605	4860	0.7	1080	715	3750	0.7	799	577	4550	0.7	1000	678
	40	3460	0.9	285	201	4090	0.9	361	238	3260	0.9	266	192	3830	0.9	334	226
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1980	1510	9.60	8.40	1980	1510	9.60	8.40	1830	1400	9.60	8.40	1830	1400	9.60	8.40
2.01 %	0	4640	0.0	3070	2070	5730	0.0	3740	2390	4410	0.0	2890	1990	5400	0.0	3500	2280
Ar(in^2)	11	4560	0.2	2760	1860	5600	0.2	3360	2160	4330	0.2	2600	1790	5280	0.2	3150	2060
=18.00	13	4530	0.3	2420	1630	5550	0.3	2940	1890	4290	0.3	2280	1560	5230	0.3	2760	1800
	17	4440	0.4	2070	1400	5430	0.4	2520	1620	4210	0.4	1950	1340	5110	0.4	2360	1540
8-#14	21	4340	0.5	1730	1160	5280	0.5	2100	1350	4120	0.5	1630	1120	4970	0.5	1970	1280
4x-2y	25	4220	0.7	1040	697	5100	0.7	1260	808	4000	0.7	976	670	4790	0.7	1180	770
	40	3650	0.9	345	232	4250	0.9	420	269	3440	0.9	325	223	3980	0.9	394	256
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1970	1510	9.60	8.40	1970	1510	9.60	8.40	1830	1400	9.60	8.40	1830	1400	9.60	8.40
3.01 %	0	4950	0.0	3430	2510	6040	0.0	4100	2840	4720	0.0	3250	2430	5710	0.0	3860	2730
Ar(in^2)	11	4850	0.2	3080	2260	5900	0.2	3690	2550	4620	0.2	2930	2190	5570	0.2	3470	2450
=27.00	13	4820	0.3	2700	1980	5840	0.3	3230	2230	4580	0.3	2560	1910	5520	0.3	3040	2150
	17	4720	0.4	2310	1690	5700	0.4	2760	1920	4490	0.4	2200	1640	5380	0.4	2610	1840
12-#14	21	4610	0.5	1930	1410	5540	0.5	2300	1600	4380	0.5	1830	1370	5220	0.5	2170	1530
4x-4y	25	4480	0.7	1160	847	5340	0.7	1380	957	4250	0.7	1100	820	5030	0.7	1300	920
	40	3820	0.9	385	282	4410	0.9	460	319	3610	0.9	365	273	4140	0.9	434	306
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1970	1510	9.60	8.40	1970	1510	9.60	8.40	1830	1400	9.60	8.40	1830	1400	9.60	8.40
4.02 %	0	5260	0.0	3620	2950	6350	0.0	4290	3280	5020	0.0	3450	2870	6010	0.0	4050	3170
Ar(in^2)	11	5150	0.2	3260	2660	6190	0.2	3860	2950	4920	0.2	3110	2590	5860	0.2	3650	2850
=36.00	13	5110	0.3	2850	2330	6130	0.3	3380	2580	4870	0.3	2720	2260	5800	0.3	3190	2500
	17	5000	0.4	2440	1990	5980	0.4	2890	2210	4770	0.4	2330	1940	5660	0.4	2730	2140
16-#14	21	4870	0.5	2040	1660	5790	0.5	2410	1850	4640	0.5	1940	1620	5480	0.5	2280	1780
4x-6y	25	4720	0.7	1220	996	5570	0.7	1450	1110	4500	0.7	1170	969	5270	0.7	1370	1070
	40	3990	0.9	407	332	4550	0.9	482	369	3780	0.9	388	323	4280	0.9	455	356
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1970	1510	9.60	8.40	1970	1510	9.60	8.40	1820	1400	9.60	8.40	1820	1400	9.60	8.40

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 28 x 32

Designation		W 14 x257								W 14 x233							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.54 %	0	3730	0.0	1970	1400	4630	0.0	2520	1680	3530	0.0	1820	1330	4340	0.0	2320	1580
Ar(in²)	11	3670	0.2	1770	1260	4530	0.2	2270	1510	3470	0.2	1640	1200	4250	0.2	2090	1420
= 4.80	13	3640	0.3	1550	1110	4500	0.3	1990	1320	3440	0.3	1440	1050	4210	0.3	1830	1250
	17	3580	0.4	1330	947	4400	0.4	1700	1130	3380	0.4	1230	898	4120	0.4	1570	1070
8-# 7	21	3510	0.5	1110	789	4290	0.5	1420	943	3310	0.5	1030	748	4010	0.5	1310	890
4x-2y	25	3420	0.7	665	473	4150	0.7	851	566	3220	0.7	615	449	3880	0.7	783	534
	40	2980	0.9	221	157	3500	0.9	283	188	2800	0.9	205	149	3270	0.9	261	178
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1700	1300	9.60	8.40	1700	1300	9.60	8.40	1570	1200	9.60	8.40	1570	1200	9.60	8.40
1.00 %	0	3880	0.0	2210	1630	4780	0.0	2760	1910	3670	0.0	2060	1560	4480	0.0	2560	1810
Ar(in²)	11	3810	0.2	1980	1470	4670	0.2	2480	1720	3600	0.2	1850	1400	4390	0.2	2300	1630
= 9.00	13	3780	0.3	1740	1290	4630	0.3	2170	1500	3580	0.3	1620	1230	4350	0.3	2010	1430
	17	3710	0.4	1490	1100	4530	0.4	1860	1290	3510	0.4	1390	1050	4250	0.4	1730	1220
4-#14	21	3630	0.5	1240	919	4410	0.5	1550	1070	3430	0.5	1160	878	4140	0.5	1440	1020
2x-2y	25	3540	0.7	744	551	4260	0.7	930	643	3340	0.7	694	526	4000	0.7	863	611
	40	3060	0.9	248	183	3570	0.9	310	214	2880	0.9	231	175	3340	0.9	287	203
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1690	1300	9.60	8.40	1690	1300	9.60	8.40	1570	1200	9.60	8.40	1570	1200	9.60	8.40
2.01 %	0	4180	0.0	2730	1910	5080	0.0	3280	2180	3980	0.0	2580	1840	4790	0.0	3080	2090
Ar(in²)	11	4100	0.2	2460	1720	4970	0.2	2960	1960	3900	0.2	2330	1650	4680	0.2	2780	1880
=18.00	13	4070	0.3	2150	1500	4920	0.3	2590	1720	3870	0.3	2040	1450	4640	0.3	2430	1640
	17	4000	0.4	1840	1290	4810	0.4	2220	1470	3790	0.4	1740	1240	4530	0.4	2080	1410
8-#14	21	3900	0.5	1540	1070	4670	0.5	1850	1230	3700	0.5	1450	1030	4390	0.5	1730	1170
4x-2y	25	3790	0.7	922	644	4500	0.7	1110	736	3590	0.7	872	619	4240	0.7	1040	704
	40	3240	0.9	307	214	3730	0.9	369	245	3060	0.9	290	206	3500	0.9	346	234
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1690	1290	9.60	8.40	1690	1290	9.60	8.40	1560	1200	9.60	8.40	1560	1200	9.60	8.40
3.01 %	0	4490	0.0	3090	2350	5390	0.0	3640	2620	4280	0.0	2940	2280	5100	0.0	3440	2530
Ar(in²)	11	4400	0.2	2780	2120	5260	0.2	3280	2360	4190	0.2	2650	2050	4970	0.2	3100	2280
=27.00	13	4360	0.3	2430	1850	5210	0.3	2870	2070	4160	0.3	2320	1800	4920	0.3	2710	1990
	17	4270	0.4	2090	1590	5080	0.4	2460	1770	4070	0.4	1990	1540	4800	0.4	2320	1710
12-#14	21	4160	0.5	1740	1320	4920	0.5	2050	1480	3960	0.5	1660	1280	4650	0.5	1940	1420
4x-4y	25	4040	0.7	1040	794	4740	0.7	1230	885	3840	0.7	993	769	4470	0.7	1160	854
	40	3420	0.9	347	264	3880	0.9	409	295	3230	0.9	331	256	3640	0.9	387	284
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1690	1290	9.60	8.40	1690	1290	9.60	8.40	1560	1190	9.60	8.40	1560	1190	9.60	8.40
4.02 %	0	4800	0.0	3300	2800	5700	0.0	3830	3070	4590	0.0	3160	2720	5410	0.0	3640	2970
Ar(in²)	11	4690	0.2	2970	2520	5550	0.2	3450	2760	4490	0.2	2840	2450	5260	0.2	3270	2680
=36.00	13	4650	0.3	2600	2200	5490	0.3	3020	2420	4450	0.3	2490	2150	5210	0.3	2860	2340
	17	4550	0.4	2230	1890	5350	0.4	2590	2070	4350	0.4	2130	1840	5070	0.4	2450	2010
16-#14	21	4430	0.5	1850	1570	5180	0.5	2160	1730	4220	0.5	1780	1530	4900	0.5	2050	1670
4x-6y	25	4280	0.7	1110	943	4970	0.7	1290	1040	4080	0.7	1070	919	4700	0.7	1230	1000
	40	3580	0.9	370	314	4020	0.9	431	345	3390	0.9	355	306	3780	0.9	409	334
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1680	1290	9.60	8.40	1680	1290	9.60	8.40	1560	1190	9.60	8.40	1560	1190	9.60	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 32

Designation		W 14 x211								W 14 x193							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.54 %	0	3340	0.0	1690	1260	4080	0.0	2140	1500	3190	0.0	1580	1210	3860	0.0	1990	1430
Ar(in²)	11	3280	0.2	1520	1140	3990	0.2	1930	1350	3130	0.2	1430	1090	3780	0.2	1790	1280
= 4.80	13	3250	0.3	1330	994	3950	0.3	1680	1180	3110	0.3	1250	951	3740	0.3	1570	1120
	17	3200	0.4	1140	852	3870	0.4	1440	1010	3050	0.4	1070	815	3660	0.4	1350	962
8-#7	21	3130	0.5	950	710	3760	0.5	1200	841	2980	0.5	891	679	3560	0.5	1120	801
4x-2y	25	3040	0.7	570	426	3640	0.7	721	504	2900	0.7	534	407	3450	0.7	673	481
	40	2630	0.9	190	142	3050	0.9	240	168	2500	0.9	178	135	2880	0.9	224	160
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1450	1110	9.60	8.40	1450	1110	9.60	8.40	1360	1040	9.60	8.40	1360	1040	9.60	8.40
1.00 %	0	3480	0.0	1920	1490	4220	0.0	2370	1720	3330	0.0	1820	1440	4010	0.0	2230	1660
Ar(in²)	11	3420	0.2	1730	1340	4120	0.2	2140	1550	3270	0.2	1640	1290	3910	0.2	2010	1490
= 9.00	13	3390	0.3	1520	1180	4090	0.3	1870	1360	3240	0.3	1430	1130	3880	0.3	1760	1300
	17	3330	0.4	1300	1010	4000	0.4	1600	1160	3180	0.4	1230	970	3790	0.4	1500	1120
4-#14	21	3250	0.5	1080	839	3880	0.5	1340	970	3110	0.5	1020	808	3680	0.5	1250	931
2x-2y	25	3160	0.7	649	503	3750	0.7	801	582	3020	0.7	614	485	3560	0.7	752	558
	40	2720	0.9	216	167	3130	0.9	267	194	2590	0.9	204	161	2960	0.9	250	186
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1450	1110	9.60	8.40	1450	1110	9.60	8.40	1360	1040	9.60	8.40	1360	1040	9.60	8.40
2.01 %	0	3790	0.0	2450	1770	4530	0.0	2900	2000	3640	0.0	2350	1710	4310	0.0	2760	1930
Ar(in²)	11	3710	0.2	2210	1590	4420	0.2	2610	1800	3560	0.2	2110	1540	4210	0.2	2480	1740
=18.00	13	3680	0.3	1930	1390	4370	0.3	2280	1580	3530	0.3	1850	1350	4170	0.3	2170	1520
	17	3610	0.4	1650	1190	4270	0.4	1960	1350	3460	0.4	1580	1160	4070	0.4	1860	1300
8-#14	21	3520	0.5	1380	995	4140	0.5	1630	1130	3370	0.5	1320	964	3940	0.5	1550	1090
4x-2y	25	3410	0.7	827	597	3990	0.7	978	675	3260	0.7	791	578	3790	0.7	930	651
	40	2890	0.9	275	199	3280	0.9	326	225	2760	0.9	263	192	3110	0.9	310	217
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1450	1110	9.60	8.40	1450	1110	9.60	8.40	1350	1040	9.60	8.40	1350	1040	9.60	8.40
3.01 %	0	4100	0.0	2810	2210	4830	0.0	3260	2440	3940	0.0	2710	2160	4620	0.0	3120	2370
Ar(in²)	11	4010	0.2	2530	1990	4710	0.2	2930	2200	3860	0.2	2440	1940	4500	0.2	2800	2140
=27.00	13	3970	0.3	2210	1740	4660	0.3	2570	1920	3820	0.3	2130	1700	4450	0.3	2450	1870
	17	3890	0.4	1900	1490	4540	0.4	2200	1650	3740	0.4	1830	1460	4340	0.4	2100	1600
12-#14	21	3780	0.5	1580	1240	4400	0.5	1830	1370	3630	0.5	1520	1210	4190	0.5	1750	1340
4x-4y	25	3650	0.7	948	746	4230	0.7	1100	824	3510	0.7	913	728	4030	0.7	1050	801
	40	3060	0.9	316	248	3430	0.9	366	274	2920	0.9	304	242	3250	0.9	350	267
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1440	1110	9.60	8.40	1440	1110	9.60	8.40	1350	1030	9.60	8.40	1350	1030	9.60	8.40
4.02 %	0	4400	0.0	3030	2660	5140	0.0	3460	2890	4250	0.0	2930	2600	4930	0.0	3320	2820
Ar(in²)	11	4300	0.2	2730	2390	5000	0.2	3110	2600	4150	0.2	2640	2340	4790	0.2	2990	2540
=36.00	13	4260	0.3	2380	2090	4950	0.3	2720	2270	4110	0.3	2310	2050	4740	0.3	2610	2220
	17	4160	0.4	2040	1790	4810	0.4	2330	1950	4010	0.4	1980	1760	4600	0.4	2240	1900
16-#14	21	4040	0.5	1700	1490	4650	0.5	1950	1620	3890	0.5	1650	1460	4440	0.5	1870	1580
4x-6y	25	3890	0.7	1020	896	4450	0.7	1170	974	3750	0.7	988	878	4250	0.7	1120	950
	40	3210	0.9	340	298	3560	0.9	389	324	3070	0.9	329	292	3380	0.9	373	316
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1440	1100	9.60	8.40	1440	1100	9.60	8.40	1350	1030	9.60	8.40	1350	1030	9.60	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 28 x 32

Designation		W 14 x176								W 14 x159							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	3040	0.0	1480	1150	3660	0.0	1850	1360	2890	0.0	1380	1100	3450	0.0	1720	1290
Ar(in²)	11	2980	0.2	1340	1040	3580	0.2	1670	1220	2840	0.2	1250	986	3370	0.2	1550	1160
= 4.80	13	2960	0.3	1170	907	3540	0.3	1460	1070	2820	0.3	1090	863	3340	0.3	1350	1010
	17	2910	0.4	1000	778	3470	0.4	1250	915	2760	0.4	934	740	3270	0.4	1160	867
8-# 7	21	2840	0.5	834	648	3370	0.5	1040	762	2700	0.5	778	616	3170	0.5	966	723
4x-2y	25	2760	0.7	500	389	3260	0.7	625	457	2620	0.7	467	370	3070	0.7	579	433
	40	2380	0.9	166	129	2720	0.9	208	152	2250	0.9	155	123	2550	0.9	193	144
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1270	972	9.60	8.40	1270	972	9.60	8.40	1180	901	9.60	8.40	1180	901	9.60	8.40
1.00 %	0	3180	0.0	1720	1380	3800	0.0	2090	1590	3040	0.0	1620	1330	3590	0.0	1950	1520
Ar(in²)	11	3120	0.2	1550	1240	3710	0.2	1880	1430	2980	0.2	1460	1190	3510	0.2	1760	1360
= 9.00	13	3100	0.3	1350	1090	3680	0.3	1650	1250	2950	0.3	1280	1050	3470	0.3	1540	1190
	17	3040	0.4	1160	933	3590	0.4	1410	1070	2890	0.4	1090	895	3390	0.4	1320	1020
4-#14	21	2970	0.5	966	778	3490	0.5	1180	892	2820	0.5	910	746	3290	0.5	1100	852
2x-2y	25	2880	0.7	580	466	3370	0.7	705	535	2740	0.7	546	447	3180	0.7	658	511
	40	2460	0.9	193	155	2790	0.9	235	178	2330	0.9	182	149	2620	0.9	219	170
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1270	970	9.60	8.40	1270	970	9.60	8.40	1180	900	9.60	8.40	1180	900	9.60	8.40
2.01 %	0	3490	0.0	2250	1660	4110	0.0	2620	1860	3340	0.0	2150	1600	3900	0.0	2480	1790
Ar(in²)	11	3420	0.2	2020	1490	4010	0.2	2350	1680	3270	0.2	1930	1440	3800	0.2	2230	1610
=18.00	13	3390	0.3	1770	1310	3970	0.3	2060	1470	3240	0.3	1690	1260	3760	0.3	1950	1410
	17	3320	0.4	1520	1120	3870	0.4	1770	1260	3170	0.4	1450	1080	3670	0.4	1670	1210
8-#14	21	3230	0.5	1260	933	3750	0.5	1470	1050	3080	0.5	1210	902	3550	0.5	1390	1010
4x-2y	25	3120	0.7	757	560	3610	0.7	882	628	2980	0.7	724	541	3410	0.7	836	604
	40	2630	0.9	252	186	2940	0.9	294	209	2490	0.9	241	180	2770	0.9	278	201
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1260	968	9.60	8.40	1260	968	9.60	8.40	1170	898	9.60	8.40	1170	898	9.60	8.40
3.01 %	0	3800	0.0	2600	2100	4420	0.0	2980	2300	3650	0.0	2510	2050	4210	0.0	2840	2240
Ar(in²)	11	3710	0.2	2340	1890	4300	0.2	2680	2070	3560	0.2	2260	1840	4090	0.2	2550	2010
=27.00	13	3680	0.3	2050	1660	4250	0.3	2340	1820	3530	0.3	1970	1610	4050	0.3	2230	1760
	17	3590	0.4	1760	1420	4140	0.4	2010	1560	3450	0.4	1690	1380	3930	0.4	1920	1510
12-#14	21	3490	0.5	1470	1180	4000	0.5	1670	1300	3340	0.5	1410	1150	3800	0.5	1600	1260
4x-4y	25	3370	0.7	879	710	3840	0.7	1000	777	3220	0.7	845	691	3640	0.7	957	754
	40	2790	0.9	293	236	3080	0.9	334	259	2650	0.9	281	230	2910	0.9	319	251
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1260	965	9.60	8.40	1260	965	9.60	8.40	1170	895	9.60	8.40	1170	895	9.60	8.40
4.02 %	0	4110	0.0	2830	2550	4720	0.0	3190	2750	3960	0.0	2740	2490	4510	0.0	3060	2680
Ar(in²)	11	4000	0.2	2550	2290	4590	0.2	2870	2470	3860	0.2	2470	2240	4380	0.2	2750	2410
=36.00	13	3960	0.3	2230	2010	4530	0.3	2510	2160	3820	0.3	2160	1960	4330	0.3	2410	2110
	17	3860	0.4	1910	1720	4400	0.4	2150	1860	3720	0.4	1850	1680	4200	0.4	2060	1810
16-#14	21	3740	0.5	1590	1430	4250	0.5	1790	1550	3600	0.5	1540	1400	4040	0.5	1720	1510
4x-6y	25	3600	0.7	956	860	4060	0.7	1080	927	3450	0.7	924	841	3860	0.7	1030	904
	40	2930	0.9	318	286	3210	0.9	358	309	2790	0.9	308	280	3030	0.9	343	301
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1260	962	9.60	8.40	1260	962	9.60	8.40	1170	892	9.60	8.40	1170	892	9.60	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 28 x 32

Designation		W 14 x145								W 14 x132							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	2780	0.0	1300	1050	3280	0.0	1610	1230	2660	0.0	1230	989	3120	0.0	1500	1150
Ar(in²)	11	2720	0.2	1170	944	3210	0.2	1450	1100	2610	0.2	1110	890	3050	0.2	1350	1040
= 4.80	13	2700	0.3	1030	826	3180	0.3	1270	966	2590	0.3	968	779	3020	0.3	1180	905
	17	2650	0.4	880	708	3110	0.4	1080	828	2540	0.4	830	668	2950	0.4	1020	776
8-# 7	21	2590	0.5	733	590	3020	0.5	903	690	2480	0.5	692	556	2870	0.5	846	646
4x-2y	25	2510	0.7	440	354	2910	0.7	542	414	2400	0.7	415	334	2770	0.7	507	388
	40	2140	0.9	146	118	2420	0.9	180	138	2040	0.9	138	111	2290	0.9	169	129
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1110	847	9.60	8.40	1110	847	9.60	8.40	1040	793	9.60	8.40	1040	793	9.60	8.40
1.00 %	0	2920	0.0	1540	1280	3430	0.0	1840	1460	2810	0.0	1470	1220	3270	0.0	1740	1380
Ar(in²)	11	2860	0.2	1390	1150	3350	0.2	1660	1310	2750	0.2	1320	1100	3190	0.2	1560	1240
= 9.00	13	2840	0.3	1210	1010	3310	0.3	1450	1150	2720	0.3	1150	961	3160	0.3	1370	1090
	17	2780	0.4	1040	863	3240	0.4	1240	984	2670	0.4	988	824	3080	0.4	1170	931
4-#14	21	2710	0.5	865	719	3140	0.5	1040	820	2600	0.5	824	686	2990	0.5	978	776
2x-2y	25	2630	0.7	519	431	3030	0.7	621	492	2520	0.7	494	412	2880	0.7	586	465
	40	2220	0.9	173	143	2490	0.9	207	164	2120	0.9	164	137	2360	0.9	195	155
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1100	845	9.60	8.40	1100	845	9.60	8.40	1030	792	9.60	8.40	1030	792	9.60	8.40
2.01 %	0	3230	0.0	2070	1560	3740	0.0	2370	1730	3110	0.0	1990	1500	3580	0.0	2270	1660
Ar(in²)	11	3150	0.2	1860	1400	3640	0.2	2130	1560	3040	0.2	1790	1350	3480	0.2	2040	1490
=18.00	13	3130	0.3	1630	1230	3600	0.3	1870	1370	3010	0.3	1570	1180	3440	0.3	1780	1300
	17	3060	0.4	1390	1050	3510	0.4	1600	1170	2940	0.4	1340	1010	3350	0.4	1530	1120
8-#14	21	2970	0.5	1160	875	3390	0.5	1330	975	2860	0.5	1120	842	3240	0.5	1270	932
4x-2y	25	2870	0.7	697	525	3260	0.7	799	585	2760	0.7	672	505	3110	0.7	764	559
	40	2390	0.9	232	175	2630	0.9	266	195	2280	0.9	224	168	2500	0.9	254	186
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1100	843	9.60	8.40	1100	843	9.60	8.40	1030	789	9.60	8.40	1030	789	9.60	8.40
3.01 %	0	3530	0.0	2430	2000	4040	0.0	2730	2180	3420	0.0	2350	1940	3880	0.0	2620	2100
Ar(in²)	11	3450	0.2	2180	1800	3930	0.2	2460	1960	3330	0.2	2120	1750	3770	0.2	2360	1890
=27.00	13	3410	0.3	1910	1580	3880	0.3	2150	1720	3300	0.3	1850	1530	3730	0.3	2070	1650
	17	3330	0.4	1640	1350	3780	0.4	1840	1470	3220	0.4	1590	1310	3620	0.4	1770	1420
12-#14	21	3230	0.5	1360	1130	3640	0.5	1530	1230	3110	0.5	1320	1090	3490	0.5	1480	1180
4x-4y	25	3110	0.7	818	675	3490	0.7	920	735	2990	0.7	793	655	3340	0.7	885	709
	40	2540	0.9	272	225	2770	0.9	306	245	2430	0.9	264	218	2630	0.9	295	236
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1100	840	9.60	8.40	1100	840	9.60	8.40	1030	786	9.60	8.40	1030	786	9.60	8.40
4.02 %	0	3840	0.0	2660	2450	4350	0.0	2950	2620	3730	0.0	2590	2390	4190	0.0	2850	2550
Ar(in²)	11	3740	0.2	2400	2200	4220	0.2	2660	2360	3620	0.2	2330	2150	4060	0.2	2570	2290
=36.00	13	3700	0.3	2100	1930	4170	0.3	2320	2060	3580	0.3	2040	1880	4010	0.3	2250	2000
	17	3600	0.4	1800	1650	4040	0.4	1990	1770	3480	0.4	1750	1610	3880	0.4	1930	1720
16-#14	21	3480	0.5	1500	1380	3890	0.5	1660	1470	3360	0.5	1460	1340	3730	0.5	1600	1430
4x-6y	25	3340	0.7	899	825	3710	0.7	996	884	3220	0.7	875	806	3560	0.7	962	858
	40	2680	0.9	299	275	2890	0.9	332	294	2560	0.9	291	268	2750	0.9	320	286
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1090	837	9.60	8.40	1090	837	9.60	8.40	1020	784	9.60	8.40	1020	784	9.60	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 28 x 32

Designation		W 12 x336								W 12 x305							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.54 %	0	4410	0.0	2340	1480	5580	0.0	3010	1780	4140	0.0	2150	1410	5210	0.0	2760	1670
Ar(in²)	11	4340	0.2	2110	1340	5470	0.2	2710	1600	4070	0.2	1940	1270	5100	0.2	2480	1500
= 4.80	13	4310	0.3	1840	1170	5420	0.3	2370	1400	4050	0.3	1700	1110	5060	0.3	2170	1320
	17	4240	0.4	1580	1000	5320	0.4	2030	1200	3980	0.4	1450	949	4950	0.4	1860	1130
8-# 7	21	4150	0.5	1320	834	5180	0.5	1690	1000	3900	0.5	1210	791	4830	0.5	1550	940
4x-2y	25	4050	0.7	789	500	5020	0.7	1020	600	3800	0.7	727	474	4680	0.7	930	564
	40	3560	0.9	263	166	4250	0.9	338	200	3330	0.9	242	158	3950	0.9	310	188
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2110	1620	9.60	8.40	2110	1620	9.60	8.40	1950	1490	9.60	8.40	1950	1490	9.60	8.40
1.00 %	0	4550	0.0	2570	1710	5730	0.0	3240	2010	4280	0.0	2390	1640	5350	0.0	2990	1900
Ar(in²)	11	4470	0.2	2320	1540	5610	0.2	2920	1810	4210	0.2	2150	1470	5240	0.2	2690	1710
= 9.00	13	4450	0.3	2030	1350	5560	0.3	2550	1580	4180	0.3	1880	1290	5190	0.3	2360	1500
	17	4370	0.4	1740	1160	5440	0.4	2190	1360	4110	0.4	1610	1100	5080	0.4	2020	1280
4-#14	21	4280	0.5	1450	964	5300	0.5	1820	1130	4020	0.5	1340	920	4950	0.5	1680	1070
2x-2y	25	4170	0.7	868	578	5130	0.7	1090	677	3920	0.7	806	552	4790	0.7	1010	641
	40	3650	0.9	289	192	4330	0.9	364	225	3410	0.9	268	184	4030	0.9	336	213
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2110	1620	9.60	8.40	2110	1620	9.60	8.40	1950	1490	9.60	8.40	1950	1490	9.60	8.40
2.01 %	0	4860	0.0	3100	1990	6030	0.0	3770	2280	4590	0.0	2910	1910	5660	0.0	3520	2180
Ar(in²)	11	4770	0.2	2790	1790	5900	0.2	3390	2060	4510	0.2	2620	1720	5530	0.2	3160	1960
=18.00	13	4740	0.3	2440	1570	5850	0.3	2970	1800	4470	0.3	2300	1510	5480	0.3	2770	1710
	17	4650	0.4	2090	1340	5720	0.4	2540	1540	4390	0.4	1970	1290	5360	0.4	2370	1470
8-#14	21	4550	0.5	1740	1120	5560	0.5	2120	1280	4290	0.5	1640	1080	5210	0.5	1980	1220
4x-2y	25	4430	0.7	1050	671	5380	0.7	1270	770	4170	0.7	983	645	5030	0.7	1190	734
	40	3830	0.9	348	223	4490	0.9	423	256	3600	0.9	327	215	4190	0.9	395	244
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2110	1610	9.60	8.40	2110	1610	9.60	8.40	1940	1490	9.60	8.40	1940	1490	9.60	8.40
3.01 %	0	5170	0.0	3460	2430	6340	0.0	4120	2730	4900	0.0	3270	2350	5960	0.0	3870	2620
Ar(in²)	11	5070	0.2	3110	2190	6190	0.2	3710	2450	4800	0.2	2950	2120	5820	0.2	3490	2360
=27.00	13	5030	0.3	2720	1920	6140	0.3	3250	2150	4770	0.3	2580	1850	5770	0.3	3050	2060
	17	4940	0.4	2330	1640	6000	0.4	2780	1840	4670	0.4	2210	1590	5630	0.4	2610	1770
12-#14	21	4820	0.5	1950	1370	5820	0.5	2320	1530	4560	0.5	1840	1320	5470	0.5	2180	1470
4x-4y	25	4680	0.7	1170	820	5620	0.7	1390	920	4430	0.7	1100	794	5270	0.7	1310	883
	40	4010	0.9	389	273	4650	0.9	463	306	3780	0.9	368	264	4350	0.9	435	294
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2100	1610	9.60	8.40	2100	1610	9.60	8.40	1940	1480	9.60	8.40	1940	1480	9.60	8.40
4.02 %	0	5470	0.0	3650	2870	6650	0.0	4310	3170	5210	0.0	3460	2800	6270	0.0	4060	3060
Ar(in²)	11	5360	0.2	3280	2590	6490	0.2	3880	2850	5100	0.2	3120	2520	6120	0.2	3660	2750
=36.00	13	5320	0.3	2870	2260	6420	0.3	3400	2500	5060	0.3	2730	2200	6050	0.3	3200	2410
	17	5210	0.4	2460	1940	6270	0.4	2910	2140	4950	0.4	2340	1890	5910	0.4	2740	2070
16-#14	21	5080	0.5	2050	1620	6080	0.5	2430	1780	4820	0.5	1950	1570	5720	0.5	2290	1720
4x-6y	25	4930	0.7	1230	970	5850	0.7	1460	1070	4670	0.7	1170	943	5510	0.7	1370	1030
	40	4190	0.9	410	323	4800	0.9	485	356	3950	0.9	389	314	4490	0.9	457	344
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		2100	1610	9.60	8.40	2100	1610	9.60	8.40	1940	1480	9.60	8.40	1940	1480	9.60	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal Wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 32

Designation		W 12 x279								W 12 x252							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	3920	0.0	2000	1340	4890	0.0	2540	1580	3690	0.0	1840	1270	4570	0.0	2330	1490
Ar(in²)	11	3850	0.2	1800	1210	4790	0.2	2290	1420	3630	0.2	1660	1150	4470	0.2	2100	1340
= 4.80	13	3820	0.3	1570	1060	4750	0.3	2000	1240	3600	0.3	1450	1000	4440	0.3	1840	1170
	17	3760	0.4	1350	905	4650	0.4	1720	1070	3540	0.4	1240	860	4340	0.4	1580	1010
8-# 7	21	3680	0.5	1120	754	4530	0.5	1430	888	3460	0.5	1040	716	4230	0.5	1310	838
4x-2y	25	3590	0.7	673	452	4390	0.7	858	533	3380	0.7	622	430	4090	0.7	787	503
	40	3130	0.9	224	150	3700	0.9	286	177	2940	0.9	207	143	3450	0.9	262	167
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1810	1390	9.60	8.40	1810	1390	9.60	8.40	1670	1280	9.60	8.40	1670	1280	9.60	8.40
1.00 %	0	4060	0.0	2230	1570	5030	0.0	2780	1810	3830	0.0	2080	1500	4710	0.0	2570	1720
Ar(in²)	11	3990	0.2	2010	1410	4930	0.2	2500	1630	3760	0.2	1870	1350	4610	0.2	2310	1550
= 9.00	13	3960	0.3	1760	1240	4880	0.3	2190	1430	3740	0.3	1640	1180	4570	0.3	2020	1360
	17	3890	0.4	1510	1060	4780	0.4	1870	1220	3670	0.4	1400	1020	4470	0.4	1730	1160
4-#14	21	3810	0.5	1250	883	4650	0.5	1560	1020	3590	0.5	1170	846	4350	0.5	1440	967
2x-2y	25	3710	0.7	752	530	4500	0.7	937	610	3490	0.7	701	507	4210	0.7	866	580
	40	3220	0.9	250	176	3780	0.9	312	203	3030	0.9	233	169	3520	0.9	288	193
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1810	1380	9.60	8.40	1810	1380	9.60	8.40	1670	1280	9.60	8.40	1670	1280	9.60	8.40
2.01 %	0	4370	0.0	2760	1850	5340	0.0	3300	2080	4140	0.0	2600	1780	5020	0.0	3090	2000
Ar(in²)	11	4290	0.2	2480	1660	5220	0.2	2970	1880	4060	0.2	2340	1600	4910	0.2	2780	1800
=18.00	13	4250	0.3	2170	1450	5170	0.3	2600	1640	4030	0.3	2050	1400	4860	0.3	2440	1570
	17	4170	0.4	1860	1250	5060	0.4	2230	1410	3950	0.4	1760	1200	4750	0.4	2090	1350
8-#14	21	4080	0.5	1550	1040	4910	0.5	1860	1170	3860	0.5	1460	1000	4610	0.5	1740	1120
4x-2y	25	3960	0.7	930	622	4740	0.7	1110	703	3750	0.7	878	600	4450	0.7	1040	673
	40	3400	0.9	310	207	3940	0.9	371	234	3210	0.9	292	200	3680	0.9	347	224
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1800	1380	9.60	8.40	1800	1380	9.60	8.40	1660	1270	9.60	8.40	1660	1270	9.60	8.40
3.01 %	0	4670	0.0	3120	2290	5650	0.0	3660	2530	4450	0.0	2960	2220	5330	0.0	3450	2440
Ar(in²)	11	4580	0.2	2800	2060	5510	0.2	3290	2270	4360	0.2	2670	2000	5200	0.2	3110	2190
=27.00	13	4540	0.3	2450	1800	5460	0.3	2880	1990	4320	0.3	2330	1750	5150	0.3	2720	1920
	17	4450	0.4	2100	1540	5330	0.4	2470	1710	4230	0.4	2000	1500	5020	0.4	2330	1650
12-#14	21	4340	0.5	1750	1290	5170	0.5	2060	1420	4120	0.5	1670	1250	4870	0.5	1940	1370
4x-4y	25	4210	0.7	1050	772	4980	0.7	1230	853	3990	0.7	999	750	4680	0.7	1160	823
	40	3580	0.9	350	257	4090	0.9	411	284	3380	0.9	333	250	3830	0.9	388	274
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1800	1380	9.60	8.40	1800	1380	9.60	8.40	1660	1270	9.60	8.40	1660	1270	9.60	8.40
4.02 %	0	4980	0.0	3310	2730	5960	0.0	3850	2970	4760	0.0	3160	2670	5640	0.0	3640	2880
Ar(in²)	11	4880	0.2	2980	2460	5800	0.2	3460	2670	4650	0.2	2840	2400	5490	0.2	3280	2590
=36.00	13	4830	0.3	2610	2150	5750	0.3	3030	2340	4610	0.3	2490	2100	5430	0.3	2870	2270
	17	4730	0.4	2230	1840	5600	0.4	2600	2000	4510	0.4	2130	1800	5290	0.4	2460	1940
16-#14	21	4610	0.5	1860	1540	5420	0.5	2170	1670	4380	0.5	1780	1500	5120	0.5	2050	1620
4x-6y	25	4460	0.7	1120	921	5210	0.7	1300	1000	4240	0.7	1070	899	4920	0.7	1230	972
	40	3750	0.9	372	307	4240	0.9	433	334	3540	0.9	355	299	3970	0.9	409	324
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1800	1380	9.60	8.40	1800	1380	9.60	8.40	1660	1270	9.60	8.40	1660	1270	9.60	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) — Column Size(b x h): 28 x 32

Designation		W 12 x230								W 12 x210							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	3500	0.0	1720	1220	4310	0.0	2170	1420	3330	0.0	1610	1170	4070	0.0	2010	1360
Ar(in²)	11	3440	0.2	1550	1100	4220	0.2	1950	1280	3270	0.2	1450	1050	3980	0.2	1810	1220
= 4.80	13	3420	0.3	1360	961	4180	0.3	1710	1120	3250	0.3	1270	920	3940	0.3	1580	1070
	17	3360	0.4	1160	823	4090	0.4	1460	959	3190	0.4	1090	789	3860	0.4	1360	915
8-# 7	21	3290	0.5	968	686	3980	0.5	1220	799	3120	0.5	905	657	3760	0.5	1130	762
4x-2y	25	3200	0.7	581	411	3850	0.7	731	479	3040	0.7	543	394	3630	0.7	679	457
	40	2780	0.9	193	137	3240	0.9	243	159	2630	0.9	181	131	3050	0.9	226	152
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1550	1190	9.60	8.40	1550	1190	9.60	8.40	1450	1110	9.60	8.40	1450	1110	9.60	8.40
1.00 %	0	3650	0.0	1960	1450	4450	0.0	2400	1650	3470	0.0	1840	1400	4210	0.0	2250	1590
Ar(in²)	11	3580	0.2	1760	1310	4350	0.2	2160	1490	3410	0.2	1660	1260	4120	0.2	2020	1430
= 9.00	13	3550	0.3	1540	1140	4320	0.3	1890	1300	3390	0.3	1450	1100	4080	0.3	1770	1250
	17	3490	0.4	1320	978	4220	0.4	1620	1110	3320	0.4	1240	944	3990	0.4	1520	1070
4-#14	21	3410	0.5	1100	815	4100	0.5	1350	928	3250	0.5	1040	787	3880	0.5	1260	891
2x-2y	25	3320	0.7	660	489	3970	0.7	810	557	3160	0.7	622	472	3750	0.7	758	535
	40	2860	0.9	220	163	3310	0.9	270	185	2710	0.9	207	157	3120	0.9	252	178
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1550	1190	9.60	8.40	1550	1190	9.60	8.40	1450	1110	9.60	8.40	1450	1110	9.60	8.40
2.01 %	0	3950	0.0	2480	1730	4760	0.0	2930	1930	3780	0.0	2370	1670	4520	0.0	2770	1860
Ar(in²)	11	3880	0.2	2230	1550	4650	0.2	2630	1730	3710	0.2	2130	1510	4410	0.2	2500	1670
=18.00	13	3850	0.3	1950	1360	4600	0.3	2310	1520	3680	0.3	1870	1320	4370	0.3	2180	1470
	17	3770	0.4	1680	1170	4500	0.4	1980	1300	3600	0.4	1600	1130	4260	0.4	1870	1260
8-#14	21	3680	0.5	1400	970	4360	0.5	1650	1080	3510	0.5	1330	942	4130	0.5	1560	1050
4x-2y	25	3570	0.7	837	582	4210	0.7	987	649	3400	0.7	800	565	3980	0.7	935	627
	40	3040	0.9	279	194	3470	0.9	329	216	2890	0.9	266	188	3270	0.9	311	209
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1550	1190	9.60	8.40	1550	1190	9.60	8.40	1440	1110	9.60	8.40	1440	1110	9.60	8.40
3.01 %	0	4260	0.0	2840	2170	5070	0.0	3290	2370	4090	0.0	2730	2120	4830	0.0	3130	2300
Ar(in²)	11	4170	0.2	2560	1950	4940	0.2	2960	2130	4000	0.2	2460	1910	4700	0.2	2820	2070
=27.00	13	4140	0.3	2240	1710	4890	0.3	2590	1860	3970	0.3	2150	1670	4650	0.3	2470	1810
	17	4050	0.4	1920	1460	4770	0.4	2220	1600	3880	0.4	1840	1430	4530	0.4	2110	1550
12-#14	21	3940	0.5	1600	1220	4620	0.5	1850	1330	3770	0.5	1540	1190	4390	0.5	1760	1300
4x-4y	25	3810	0.7	958	732	4440	0.7	1110	799	3650	0.7	921	714	4220	0.7	1060	777
	40	3210	0.9	319	244	3620	0.9	369	266	3050	0.9	307	238	3420	0.9	352	259
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1550	1180	9.60	8.40	1550	1180	9.60	8.40	1440	1100	9.60	8.40	1440	1100	9.60	8.40
4.02 %	0	4570	0.0	3040	2610	5370	0.0	3480	2810	4400	0.0	2930	2560	5130	0.0	3320	2750
Ar(in²)	11	4460	0.2	2740	2350	5230	0.2	3130	2530	4290	0.2	2640	2310	4990	0.2	2990	2470
=36.00	13	4420	0.3	2400	2060	5170	0.3	2740	2210	4250	0.3	2310	2020	4940	0.3	2620	2160
	17	4320	0.4	2050	1760	5040	0.4	2350	1900	4150	0.4	1980	1730	4800	0.4	2240	1850
16-#14	21	4200	0.5	1710	1470	4870	0.5	1950	1580	4030	0.5	1650	1440	4640	0.5	1870	1540
4x-6y	25	4060	0.7	1030	881	4670	0.7	1170	948	3890	0.7	990	864	4450	0.7	1120	926
	40	3370	0.9	342	293	3760	0.9	390	316	3210	0.9	330	288	3550	0.9	374	308
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1540	1180	9.60	8.40	1540	1180	9.60	8.40	1440	1100	9.60	8.40	1440	1100	9.60	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 28 x 32

Designation		W 12 x190								W 12 x170							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	3160	0.0	1500	1120	3820	0.0	1860	1290	2990	0.0	1390	1060	3580	0.0	1710	1220
Ar(in²)	11	3100	0.2	1350	1010	3740	0.2	1670	1160	2930	0.2	1250	957	3500	0.2	1540	1100
= 4.80	13	3080	0.3	1180	879	3700	0.3	1470	1020	2910	0.3	1100	837	3470	0.3	1350	963
	17	3020	0.4	1010	753	3620	0.4	1260	870	2860	0.4	940	717	3400	0.4	1160	826
8-# 7	21	2950	0.5	843	628	3520	0.5	1050	725	2790	0.5	783	598	3300	0.5	963	688
4x-2y	25	2870	0.7	506	376	3410	0.7	628	435	2710	0.7	470	358	3190	0.7	578	413
	40	2480	0.9	168	125	2850	0.9	209	145	2330	0.9	156	119	2660	0.9	192	137
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1340	1030	9.60	8.40	1340	1030	9.60	8.40	1240	947	9.60	8.40	1240	947	9.60	8.40
1.00 %	0	3300	0.0	1730	1350	3960	0.0	2100	1520	3130	0.0	1630	1290	3730	0.0	1950	1450
Ar(in²)	11	3240	0.2	1560	1210	3870	0.2	1890	1370	3070	0.2	1460	1160	3640	0.2	1750	1310
= 9.00	13	3210	0.3	1370	1060	3840	0.3	1650	1200	3050	0.3	1280	1020	3610	0.3	1530	1140
	17	3150	0.4	1170	909	3750	0.4	1410	1030	2990	0.4	1100	873	3520	0.4	1310	981
4-#14	21	3080	0.5	975	757	3650	0.5	1180	854	2910	0.5	915	727	3420	0.5	1100	817
2x-2y	25	2990	0.7	585	454	3520	0.7	707	512	2830	0.7	549	436	3300	0.7	657	490
	40	2560	0.9	195	151	2920	0.9	235	170	2410	0.9	183	145	2730	0.9	219	163
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1340	1030	9.60	8.40	1340	1030	9.60	8.40	1240	946	9.60	8.40	1240	946	9.60	8.40
2.01 %	0	3610	0.0	2260	1620	4270	0.0	2620	1800	3440	0.0	2150	1570	4030	0.0	2470	1730
Ar(in²)	11	3530	0.2	2030	1460	4170	0.2	2360	1620	3370	0.2	1940	1410	3930	0.2	2230	1560
=18.00	13	3500	0.3	1780	1280	4130	0.3	2060	1410	3340	0.3	1700	1240	3890	0.3	1950	1360
	17	3430	0.4	1530	1100	4030	0.4	1770	1210	3270	0.4	1450	1060	3800	0.4	1670	1170
8-#14	21	3340	0.5	1270	912	3900	0.5	1470	1010	3180	0.5	1210	883	3680	0.5	1390	972
4x-2y	25	3240	0.7	763	547	3760	0.7	884	605	3070	0.7	726	529	3540	0.7	834	583
	40	2730	0.9	254	182	3070	0.9	294	201	2580	0.9	242	176	2880	0.9	278	194
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1340	1020	9.60	8.40	1340	1020	9.60	8.40	1230	943	9.60	8.40	1230	943	9.60	8.40
3.01 %	0	3920	0.0	2620	2070	4580	0.0	2980	2240	3750	0.0	2510	2010	4340	0.0	2830	2170
Ar(in²)	11	3830	0.2	2360	1860	4460	0.2	2680	2010	3660	0.2	2260	1810	4220	0.2	2550	1960
=27.00	13	3790	0.3	2060	1630	4410	0.3	2350	1760	3620	0.3	1980	1590	4180	0.3	2230	1710
	17	3710	0.4	1770	1400	4300	0.4	2010	1510	3540	0.4	1700	1360	4070	0.4	1910	1470
12-#14	21	3600	0.5	1470	1160	4150	0.5	1680	1260	3440	0.5	1410	1130	3930	0.5	1590	1220
4x-4y	25	3480	0.7	884	697	3990	0.7	1010	755	3310	0.7	847	679	3770	0.7	955	733
	40	2890	0.9	294	232	3220	0.9	335	251	2740	0.9	282	226	3020	0.9	318	244
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1330	1020	9.60	8.40	1330	1020	9.60	8.40	1230	940	9.60	8.40	1230	940	9.60	8.40
4.02 %	0	4220	0.0	2830	2510	4890	0.0	3180	2680	4050	0.0	2720	2460	4650	0.0	3030	2620
Ar(in²)	11	4120	0.2	2550	2260	4750	0.2	2860	2410	3950	0.2	2450	2210	4510	0.2	2730	2350
=36.00	13	4080	0.3	2230	1980	4700	0.3	2500	2110	3910	0.3	2150	1940	4460	0.3	2390	2060
	17	3980	0.4	1910	1690	4560	0.4	2140	1810	3810	0.4	1840	1660	4330	0.4	2050	1770
16-#14	21	3860	0.5	1590	1410	4400	0.5	1790	1510	3690	0.5	1530	1380	4180	0.5	1710	1470
4x-6y	25	3720	0.7	954	847	4220	0.7	1070	904	3550	0.7	919	829	3990	0.7	1020	882
	40	3050	0.9	318	282	3350	0.9	357	301	2880	0.9	306	276	3150	0.9	341	294
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1330	1020	9.60	8.40	1330	1020	9.60	8.40	1230	938	9.60	8.40	1230	938	9.60	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 28 x 32

Designation		W 12 x152								W 12 x136							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.54 %	0	2830	0.0	1300	1010	3370	0.0	1580	1160	2690	0.0	1210	966	3170	0.0	1460	1110
Ar(in²)	11	2780	0.2	1170	912	3290	0.2	1420	1050	2640	0.2	1090	869	3100	0.2	1320	994
= 4.80	13	2760	0.3	1020	798	3260	0.3	1250	915	2620	0.3	954	760	3070	0.3	1150	870
	17	2710	0.4	876	684	3190	0.4	1070	784	2570	0.4	818	652	3000	0.4	988	745
8-# 7	21	2640	0.5	730	570	3100	0.5	889	653	2510	0.5	681	543	2910	0.5	823	621
4x-2y	25	2570	0.7	438	342	2990	0.7	533	392	2430	0.7	409	326	2810	0.7	494	372
	40	2200	0.9	146	114	2490	0.9	177	130	2070	0.9	136	108	2330	0.9	164	124
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1140	874	9.60	8.40	1140	874	9.60	8.40	1060	808	9.60	8.40	1060	808	9.60	8.40
1.00 %	0	2980	0.0	1530	1240	3510	0.0	1820	1390	2840	0.0	1450	1200	3310	0.0	1700	1340
Ar(in²)	11	2920	0.2	1380	1120	3430	0.2	1630	1250	2780	0.2	1300	1080	3230	0.2	1530	1200
= 9.00	13	2890	0.3	1210	979	3390	0.3	1430	1100	2760	0.3	1140	942	3200	0.3	1340	1050
	17	2840	0.4	1030	839	3310	0.4	1230	940	2700	0.4	976	807	3130	0.4	1150	901
4-#14	21	2770	0.5	861	699	3220	0.5	1020	783	2630	0.5	813	673	3030	0.5	955	751
2x-2y	25	2680	0.7	517	419	3100	0.7	613	470	2550	0.7	488	403	2920	0.7	573	450
	40	2280	0.9	172	139	2560	0.9	204	156	2150	0.9	162	134	2400	0.9	191	150
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1140	873	9.60	8.40	1140	873	9.60	8.40	1050	807	9.60	8.40	1050	807	9.60	8.40
2.01 %	0	3290	0.0	2060	1520	3820	0.0	2340	1670	3150	0.0	1970	1470	3620	0.0	2220	1610
Ar(in²)	11	3210	0.2	1850	1370	3720	0.2	2110	1500	3070	0.2	1780	1330	3520	0.2	2000	1450
=18.00	13	3180	0.3	1620	1200	3680	0.3	1840	1310	3050	0.3	1550	1160	3490	0.3	1750	1270
	17	3110	0.4	1390	1030	3590	0.4	1580	1130	2980	0.4	1330	994	3400	0.4	1500	1090
8-#14	21	3030	0.5	1160	855	3470	0.5	1320	938	2890	0.5	1110	828	3280	0.5	1250	906
4x-2y	25	2930	0.7	694	513	3340	0.7	790	563	2790	0.7	665	497	3150	0.7	750	543
	40	2440	0.9	231	171	2700	0.9	263	187	2310	0.9	221	165	2540	0.9	250	181
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1140	870	9.60	8.40	1140	870	9.60	8.40	1050	804	9.60	8.40	1050	804	9.60	8.40
3.01 %	0	3590	0.0	2420	1970	4120	0.0	2700	2110	3450	0.0	2330	1920	3930	0.0	2580	2060
Ar(in²)	11	3510	0.2	2180	1770	4010	0.2	2430	1900	3370	0.2	2100	1730	3820	0.2	2320	1850
=27.00	13	3470	0.3	1900	1550	3960	0.3	2130	1660	3330	0.3	1840	1510	3770	0.3	2030	1620
	17	3390	0.4	1630	1330	3860	0.4	1820	1430	3250	0.4	1570	1290	3660	0.4	1740	1390
12-#14	21	3280	0.5	1360	1110	3720	0.5	1520	1190	3150	0.5	1310	1080	3530	0.5	1450	1160
4x-4y	25	3160	0.7	815	663	3560	0.7	911	712	3020	0.7	786	647	3380	0.7	871	693
	40	2590	0.9	271	221	2840	0.9	303	237	2460	0.9	262	215	2670	0.9	290	231
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1130	868	9.60	8.40	1130	868	9.60	8.40	1050	802	9.60	8.40	1050	802	9.60	8.40
4.02 %	0	3900	0.0	2630	2410	4430	0.0	2910	2560	3760	0.0	2550	2360	4240	0.0	2790	2500
Ar(in²)	11	3800	0.2	2370	2170	4300	0.2	2620	2300	3660	0.2	2300	2130	4100	0.2	2510	2250
=36.00	13	3760	0.3	2070	1900	4250	0.3	2290	2010	3620	0.3	2010	1860	4050	0.3	2200	1970
	17	3660	0.4	1780	1630	4120	0.4	1960	1720	3520	0.4	1720	1590	3930	0.4	1880	1690
16-#14	21	3540	0.5	1480	1360	3970	0.5	1630	1440	3400	0.5	1440	1330	3780	0.5	1570	1410
4x-6y	25	3400	0.7	888	813	3790	0.7	980	862	3250	0.7	861	797	3600	0.7	942	843
	40	2730	0.9	296	271	2960	0.9	326	287	2600	0.9	287	265	2790	0.9	314	281
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1130	865	9.60	8.40	1130	865	9.60	8.40	1040	799	9.60	8.40	1040	799	9.60	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 32

Designation		W 14 x426								W 14 x398							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.52 %	0	4950	0.0	2950	1710	6430	0.0	3890	2180	4710	0.0	2760	1630	6110	0.0	3630	2060
Ar(in²)	11	4840	0.2	2650	1540	6260	0.2	3500	1960	4620	0.2	2490	1470	5940	0.2	3270	1850
= 4.00	13	4800	0.3	2320	1350	6200	0.3	3060	1710	4580	0.3	2180	1280	5880	0.3	2860	1620
	17	4710	0.4	1990	1160	6030	0.4	2620	1470	4480	0.4	1870	1100	5720	0.4	2450	1390
4-# 9	21	4590	0.5	1660	964	5830	0.5	2190	1220	4370	0.5	1550	916	5530	0.5	2040	1160
2x-2y	25	4440	0.7	995	578	5600	0.7	1310	734	4230	0.7	932	549	5310	0.7	1230	693
	40	3760	0.9	331	192	4510	0.9	437	244	3580	0.9	310	183	4270	0.9	408	231
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2530	1430	9.60	7.20	2530	1430	9.60	7.20	2390	1340	9.60	7.20	2390	1340	9.60	7.20
1.04 %	0	5080	0.0	3190	1810	6570	0.0	4130	2270	4850	0.0	3000	1730	6240	0.0	3870	2150
Ar(in²)	11	4980	0.2	2870	1630	6390	0.2	3710	2050	4750	0.2	2700	1550	6070	0.2	3480	1940
= 8.00	13	4930	0.3	2510	1430	6320	0.3	3250	1790	4710	0.3	2370	1360	6010	0.3	3050	1700
	17	4830	0.4	2150	1220	6150	0.4	2780	1540	4610	0.4	2030	1170	5840	0.4	2610	1450
8-# 9	21	4700	0.5	1790	1020	5940	0.5	2320	1280	4480	0.5	1690	971	5640	0.5	2180	1210
4x-2y	25	4550	0.7	1080	612	5700	0.7	1390	767	4340	0.7	1010	583	5410	0.7	1310	727
	40	3840	0.9	358	204	4570	0.9	464	255	3650	0.9	338	194	4330	0.9	435	242
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2530	1420	9.60	7.20	2530	1420	9.60	7.20	2390	1340	9.60	7.20	2390	1340	9.60	7.20
2.08 %	0	5360	0.0	3620	2170	6840	0.0	4560	2630	5120	0.0	3440	2090	6520	0.0	4300	2510
Ar(in²)	11	5240	0.2	3260	1950	6650	0.2	4100	2370	5010	0.2	3090	1880	6330	0.2	3870	2260
=16.00	13	5190	0.3	2850	1710	6570	0.3	3590	2070	4960	0.3	2710	1640	6260	0.3	3390	1980
	17	5080	0.4	2440	1470	6390	0.4	3080	1780	4850	0.4	2320	1410	6080	0.4	2910	1700
4-#18	21	4940	0.5	2040	1220	6160	0.5	2560	1480	4720	0.5	1930	1170	5860	0.5	2420	1410
2x-2y	25	4770	0.7	1220	733	5900	0.7	1540	888	4560	0.7	1160	703	5610	0.7	1450	847
	40	3980	0.9	407	244	4680	0.9	512	296	3790	0.9	386	234	4440	0.9	484	282
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		2530	1420	9.60	7.20	2530	1420	9.60	7.20	2390	1340	9.60	7.20	2390	1340	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 32

Designation		W 14 x370								W 14 x342							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.52 %	0	4480	0.0	2590	1540	5780	0.0	3390	1940	4250	0.0	2410	1460	5450	0.0	3140	1820
Ar(in²)	11	4390	0.2	2330	1390	5620	0.2	3050	1740	4160	0.2	2170	1320	5300	0.2	2830	1640
= 4.00	13	4350	0.3	2040	1220	5560	0.3	2670	1530	4120	0.3	1900	1150	5240	0.3	2470	1430
	17	4260	0.4	1750	1040	5410	0.4	2290	1310	4040	0.4	1630	986	5100	0.4	2120	1230
4-# 9	21	4150	0.5	1450	869	5230	0.5	1910	1090	3930	0.5	1350	822	4930	0.5	1770	1020
2x-2y	25	4020	0.7	872	521	5020	0.7	1140	654	3800	0.7	812	493	4730	0.7	1060	614
	40	3390	0.9	290	173	4030	0.9	381	218	3200	0.9	270	164	3790	0.9	353	204
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2250	1260	9.60	7.20	2250	1260	9.60	7.20	2100	1180	9.60	7.20	2100	1180	9.60	7.20
1.04 %	0	4620	0.0	2830	1640	5910	0.0	3630	2040	4380	0.0	2650	1560	5590	0.0	3380	1920
Ar(in²)	11	4520	0.2	2540	1480	5750	0.2	3260	1830	4290	0.2	2380	1400	5430	0.2	3040	1730
= 8.00	13	4480	0.3	2230	1290	5690	0.3	2860	1600	4250	0.3	2090	1230	5370	0.3	2660	1510
	17	4380	0.4	1910	1110	5530	0.4	2450	1380	4160	0.4	1790	1050	5220	0.4	2280	1300
8-# 9	21	4260	0.5	1590	924	5340	0.5	2040	1150	4050	0.5	1490	877	5040	0.5	1900	1080
4x-2y	25	4130	0.7	953	554	5120	0.7	1220	687	3910	0.7	893	526	4830	0.7	1140	648
	40	3460	0.9	317	184	4090	0.9	408	229	3270	0.9	297	175	3850	0.9	380	216
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2250	1260	9.60	7.20	2250	1260	9.60	7.20	2100	1180	9.60	7.20	2100	1180	9.60	7.20
2.08 %	0	4890	0.0	3260	2000	6190	0.0	4060	2400	4660	0.0	3080	1920	5860	0.0	3820	2280
Ar(in²)	11	4780	0.2	2930	1800	6010	0.2	3650	2160	4550	0.2	2770	1730	5690	0.2	3430	2050
=16.00	13	4740	0.3	2570	1580	5940	0.3	3200	1890	4510	0.3	2430	1510	5620	0.3	3000	1790
	17	4630	0.4	2200	1350	5770	0.4	2740	1620	4400	0.4	2080	1300	5460	0.4	2580	1540
4-#18	21	4500	0.5	1830	1130	5560	0.5	2280	1350	4280	0.5	1730	1080	5260	0.5	2150	1280
2x-2y	25	4340	0.7	1100	675	5320	0.7	1370	808	4130	0.7	1040	647	5030	0.7	1290	769
	40	3600	0.9	366	225	4200	0.9	456	269	3410	0.9	346	215	3960	0.9	429	256
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		2240	1260	9.60	7.20	2240	1260	9.60	7.20	2100	1180	9.60	7.20	2100	1180	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = $Pex(KxLx)^2/10000.$ (kip-ft²), Cey = $Pey(KyLy)^2/10000.$ (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 32

Designation		W 14 x311								W 14 x283							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.52 %	0	3970	0.0	2220	1370	5060	0.0	2880	1700	3730	0.0	2040	1290	4720	0.0	2650	1590
Ar(in²)	11	3880	0.2	1990	1230	4920	0.2	2590	1530	3650	0.2	1840	1160	4590	0.2	2380	1430
= 4.00	13	3850	0.3	1740	1080	4860	0.3	2270	1340	3620	0.3	1610	1020	4540	0.3	2080	1250
	17	3770	0.4	1500	925	4730	0.4	1940	1150	3540	0.4	1380	872	4420	0.4	1790	1070
4-# 9	21	3670	0.5	1250	771	4570	0.5	1620	954	3440	0.5	1150	726	4270	0.5	1490	891
2x-2y	25	3550	0.7	747	462	4380	0.7	971	572	3330	0.7	689	436	4090	0.7	892	535
	40	2980	0.9	249	154	3500	0.9	323	190	2790	0.9	229	145	3260	0.9	297	178
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1930	1090	9.60	7.20	1930	1090	9.60	7.20	1790	1000	9.60	7.20	1790	1000	9.60	7.20
1.04 %	0	4110	0.0	2460	1470	5190	0.0	3120	1800	3870	0.0	2290	1390	4860	0.0	2890	1680
Ar(in²)	11	4010	0.2	2210	1320	5050	0.2	2810	1620	3780	0.2	2060	1250	4720	0.2	2600	1520
= 8.00	13	3980	0.3	1930	1160	4990	0.3	2460	1410	3750	0.3	1800	1100	4670	0.3	2270	1330
	17	3890	0.4	1660	992	4850	0.4	2110	1210	3660	0.4	1540	939	4540	0.4	1950	1140
8-# 9	21	3780	0.5	1380	827	4680	0.5	1750	1010	3560	0.5	1290	782	4380	0.5	1620	947
4x-2y	25	3650	0.7	828	496	4480	0.7	1050	605	3440	0.7	771	469	4190	0.7	973	568
	40	3050	0.9	276	165	3560	0.9	350	201	2860	0.9	257	156	3320	0.9	324	189
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1930	1090	9.60	7.20	1930	1090	9.60	7.20	1780	1000	9.60	7.20	1780	1000	9.60	7.20
2.08 %	0	4380	0.0	2890	1830	5470	0.0	3550	2150	4140	0.0	2720	1750	5130	0.0	3320	2040
Ar(in²)	11	4270	0.2	2600	1650	5300	0.2	3200	1940	4040	0.2	2450	1570	4980	0.2	2990	1840
=16.00	13	4230	0.3	2280	1440	5240	0.3	2800	1700	4000	0.3	2140	1380	4920	0.3	2610	1610
	17	4130	0.4	1950	1230	5090	0.4	2400	1450	3910	0.4	1840	1180	4770	0.4	2240	1380
4-#18	21	4010	0.5	1630	1030	4900	0.5	2000	1210	3790	0.5	1530	984	4590	0.5	1870	1150
2x-2y	25	3870	0.7	975	617	4680	0.7	1200	726	3650	0.7	917	590	4390	0.7	1120	689
	40	3180	0.9	325	205	3670	0.9	399	242	2990	0.9	305	196	3430	0.9	373	229
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1930	1080	9.60	7.20	1930	1080	9.60	7.20	1780	1000	9.60	7.20	1780	1000	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 24 x 32

Designation		W 14 x257								W 14 x233							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.52 %	0	3510	0.0	1880	1220	4410	0.0	2430	1480	3300	0.0	1740	1150	4120	0.0	2230	1390
Ar(in²)	11	3430	0.2	1700	1100	4290	0.2	2190	1340	3230	0.2	1560	1030	4000	0.2	2010	1250
= 4.00	13	3400	0.3	1480	959	4240	0.3	1910	1170	3200	0.3	1370	904	3960	0.3	1760	1090
	17	3330	0.4	1270	822	4120	0.4	1640	1000	3130	0.4	1170	775	3850	0.4	1510	938
4-# 9	21	3230	0.5	1060	685	3980	0.5	1370	834	3040	0.5	977	645	3710	0.5	1250	781
2x-2y	25	3120	0.7	636	411	3810	0.7	819	500	2930	0.7	586	387	3550	0.7	752	469
	40	2600	0.9	212	137	3030	0.9	273	166	2440	0.9	195	129	2820	0.9	250	156
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1650	926	9.60	7.20	1650	926	9.60	7.20	1520	855	9.60	7.20	1520	855	9.60	7.20
1.04 %	0	3650	0.0	2130	1320	4550	0.0	2670	1580	3440	0.0	1980	1250	4250	0.0	2470	1490
Ar(in²)	11	3560	0.2	1910	1190	4410	0.2	2400	1420	3360	0.2	1780	1120	4130	0.2	2220	1340
= 8.00	13	3530	0.3	1670	1040	4360	0.3	2100	1250	3330	0.3	1560	982	4080	0.3	1950	1170
	17	3450	0.4	1440	889	4240	0.4	1800	1070	3250	0.4	1340	842	3960	0.4	1670	1010
8-# 9	21	3350	0.5	1200	741	4090	0.5	1500	890	3150	0.5	1110	701	3820	0.5	1390	837
4x-2y	25	3230	0.7	717	444	3910	0.7	900	534	3040	0.7	667	421	3650	0.7	833	502
	40	2670	0.9	239	148	3090	0.9	300	178	2500	0.9	222	140	2870	0.9	277	167
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1650	926	9.60	7.20	1650	926	9.60	7.20	1520	854	9.60	7.20	1520	854	9.60	7.20
2.08 %	0	3920	0.0	2560	1680	4820	0.0	3100	1940	3710	0.0	2410	1610	4530	0.0	2900	1850
Ar(in²)	11	3820	0.2	2300	1510	4670	0.2	2790	1750	3620	0.2	2170	1450	4390	0.2	2610	1660
=16.00	13	3780	0.3	2020	1320	4610	0.3	2440	1530	3580	0.3	1900	1270	4330	0.3	2290	1450
	17	3690	0.4	1730	1130	4470	0.4	2090	1310	3490	0.4	1630	1080	4200	0.4	1960	1250
4-#18	21	3570	0.5	1440	942	4300	0.5	1750	1090	3380	0.5	1360	903	4040	0.5	1630	1040
2x-2y	25	3440	0.7	863	565	4100	0.7	1050	655	3250	0.7	814	542	3850	0.7	980	623
	40	2810	0.9	287	188	3200	0.9	349	218	2630	0.9	271	180	2980	0.9	326	207
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1640	924	9.60	7.20	1640	924	9.60	7.20	1520	852	9.60	7.20	1520	852	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 32

Designation		W 14 x211								W 14 x193							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.52 %	0	3110	0.0	1600	1080	3850	0.0	2050	1310	2960	0.0	1500	1030	3640	0.0	1910	1240
Ar(in²)	11	3040	0.2	1440	974	3740	0.2	1840	1170	2890	0.2	1350	928	3530	0.2	1720	1120
= 4.00	13	3010	0.3	1260	853	3700	0.3	1610	1030	2870	0.3	1180	812	3490	0.3	1500	975
	17	2940	0.4	1080	731	3590	0.4	1380	880	2800	0.4	1010	696	3390	0.4	1290	836
4-# 9	21	2860	0.5	902	609	3460	0.5	1150	734	2720	0.5	843	580	3270	0.5	1070	696
2x-2y	25	2760	0.7	541	365	3310	0.7	691	440	2620	0.7	506	348	3130	0.7	644	418
	40	2280	0.9	180	121	2620	0.9	230	146	2160	0.9	168	116	2470	0.9	214	139
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1400	789	9.60	7.20	1400	789	9.60	7.20	1310	737	9.60	7.20	1310	737	9.60	7.20
1.04 %	0	3250	0.0	1850	1180	3990	0.0	2290	1400	3100	0.0	1740	1130	3780	0.0	2150	1340
Ar(in²)	11	3170	0.2	1660	1060	3870	0.2	2060	1260	3020	0.2	1570	1020	3660	0.2	1930	1200
= 8.00	13	3140	0.3	1450	931	3820	0.3	1800	1110	2990	0.3	1370	890	3620	0.3	1690	1050
	17	3070	0.4	1250	798	3710	0.4	1550	947	2920	0.4	1180	763	3510	0.4	1450	903
8-# 9	21	2970	0.5	1040	665	3570	0.5	1290	789	2830	0.5	979	636	3380	0.5	1210	752
4x-2y	25	2860	0.7	622	399	3410	0.7	773	473	2720	0.7	587	381	3220	0.7	725	451
	40	2350	0.9	207	133	2680	0.9	257	157	2220	0.9	195	127	2520	0.9	241	150
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1400	788	9.60	7.20	1400	788	9.60	7.20	1310	736	9.60	7.20	1310	736	9.60	7.20
2.08 %	0	3520	0.0	2280	1540	4260	0.0	2720	1760	3370	0.0	2180	1490	4050	0.0	2580	1700
Ar(in²)	11	3430	0.2	2050	1390	4130	0.2	2450	1590	3280	0.2	1960	1340	3920	0.2	2320	1530
=16.00	13	3400	0.3	1800	1210	4070	0.3	2150	1390	3250	0.3	1710	1170	3870	0.3	2030	1340
	17	3310	0.4	1540	1040	3950	0.4	1840	1190	3160	0.4	1470	1010	3740	0.4	1740	1150
4-#18	21	3200	0.5	1280	867	3790	0.5	1530	991	3050	0.5	1220	838	3590	0.5	1450	954
2x-2y	25	3070	0.7	769	520	3610	0.7	919	594	2930	0.7	734	503	3420	0.7	871	572
	40	2480	0.9	256	173	2780	0.9	306	198	2350	0.9	244	167	2620	0.9	290	190
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1400	787	9.60	7.20	1400	787	9.60	7.20	1310	734	9.60	7.20	1310	734	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 32

Designation		W 14 x176								W 14 x159							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.52 %	0	2820	0.0	1400	979	3430	0.0	1770	1170	2670	0.0	1300	927	3230	0.0	1630	1110
Ar(in²)	11	2750	0.2	1260	881	3330	0.2	1590	1050	2600	0.2	1170	834	3130	0.2	1470	994
= 4.00	13	2720	0.3	1100	771	3290	0.3	1390	922	2580	0.3	1020	730	3090	0.3	1290	870
	17	2660	0.4	944	661	3200	0.4	1190	790	2510	0.4	877	625	3000	0.4	1100	745
4-# 9	21	2580	0.5	787	551	3080	0.5	995	658	2440	0.5	731	521	2890	0.5	917	621
2x-2y	25	2480	0.7	472	330	2940	0.7	597	395	2350	0.7	438	312	2760	0.7	550	372
	40	2040	0.9	157	110	2320	0.9	199	131	1920	0.9	146	104	2160	0.9	183	124
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1220	686	9.60	7.20	1220	686	9.60	7.20	1130	635	9.60	7.20	1130	635	9.60	7.20
1.04 %	0	2950	0.0	1640	1080	3570	0.0	2010	1270	2810	0.0	1540	1030	3360	0.0	1870	1200
Ar(in²)	11	2880	0.2	1480	971	3460	0.2	1810	1140	2730	0.2	1390	924	3260	0.2	1690	1080
= 8.00	13	2850	0.3	1290	849	3420	0.3	1580	1000	2700	0.3	1210	808	3220	0.3	1480	948
	17	2780	0.4	1110	728	3320	0.4	1360	857	2630	0.4	1040	693	3120	0.4	1260	813
8-# 9	21	2690	0.5	922	607	3190	0.5	1130	714	2550	0.5	867	577	3000	0.5	1050	677
4x-2y	25	2590	0.7	553	364	3040	0.7	678	428	2450	0.7	520	346	2860	0.7	632	406
	40	2100	0.9	184	121	2370	0.9	226	142	1980	0.9	173	115	2210	0.9	210	135
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1220	685	9.60	7.20	1220	685	9.60	7.20	1130	634	9.60	7.20	1130	634	9.60	7.20
2.08 %	0	3230	0.0	2070	1440	3840	0.0	2450	1630	3080	0.0	1980	1390	3640	0.0	2310	1560
Ar(in²)	11	3140	0.2	1870	1290	3720	0.2	2200	1470	2990	0.2	1780	1250	3510	0.2	2080	1410
=16.00	13	3100	0.3	1630	1130	3670	0.3	1930	1280	2960	0.3	1560	1090	3470	0.3	1820	1230
	17	3020	0.4	1400	971	3550	0.4	1650	1100	2870	0.4	1330	936	3350	0.4	1560	1060
4-#18	21	2910	0.5	1170	809	3400	0.5	1380	916	2770	0.5	1110	780	3210	0.5	1300	879
2x-2y	25	2790	0.7	700	485	3230	0.7	825	549	2650	0.7	666	468	3050	0.7	778	527
	40	2230	0.9	233	161	2470	0.9	275	183	2100	0.9	222	156	2310	0.9	259	175
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1220	684	9.60	7.20	1220	684	9.60	7.20	1120	632	9.60	7.20	1120	632	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 3.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 32

Designation		W 14 x145								W 14 x132							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.52 %	0	2550	0.0	1220	883	3060	0.0	1520	1050	2440	0.0	1150	826	2900	0.0	1420	974
Ar(in²)	11	2490	0.2	1100	795	2970	0.2	1370	944	2380	0.2	1030	744	2810	0.2	1280	877
= 4.00	13	2460	0.3	961	695	2930	0.3	1200	826	2350	0.3	902	651	2780	0.3	1120	767
	17	2400	0.4	823	596	2850	0.4	1030	708	2290	0.4	773	558	2690	0.4	957	657
4-# 9	21	2330	0.5	686	496	2740	0.5	856	590	2220	0.5	644	465	2590	0.5	798	548
2x-2y	25	2240	0.7	411	298	2610	0.7	513	354	2130	0.7	386	279	2470	0.7	478	328
	40	1820	0.9	137	99	2040	0.9	171	118	1730	0.9	128	93	1920	0.9	159	109
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1060	594	9.60	7.20	1060	594	9.60	7.20	987	555	9.60	7.20	987	555	9.60	7.20
1.04 %	0	2690	0.0	1460	983	3200	0.0	1760	1150	2580	0.0	1390	926	3040	0.0	1660	1070
Ar(in²)	11	2620	0.2	1320	885	3100	0.2	1590	1030	2510	0.2	1250	834	2940	0.2	1490	966
= 8.00	13	2590	0.3	1150	774	3060	0.3	1390	905	2480	0.3	1090	729	2900	0.3	1310	845
	17	2520	0.4	986	663	2960	0.4	1190	775	2410	0.4	936	625	2810	0.4	1120	725
8-# 9	21	2440	0.5	822	553	2850	0.5	991	646	2330	0.5	780	521	2700	0.5	933	604
4x-2y	25	2340	0.7	493	331	2710	0.7	595	387	2230	0.7	468	312	2570	0.7	560	362
	40	1880	0.9	164	110	2090	0.9	198	129	1790	0.9	156	104	1970	0.9	186	120
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1060	594	9.60	7.20	1060	594	9.60	7.20	986	554	9.60	7.20	986	554	9.60	7.20
2.08 %	0	2960	0.0	1900	1340	3470	0.0	2200	1510	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	2880	0.2	1710	1210	3350	0.2	1980	1360	0	0.2	0	0	0	0.2	0	0
=16.00	13	2840	0.3	1490	1060	3310	0.3	1730	1190	0	0.3	0	0	0	0.3	0	0
	17	2760	0.4	1280	906	3190	0.4	1480	1020	0	0.4	0	0	0	0.4	0	0
4-#18	21	2660	0.5	1070	755	3060	0.5	1240	848	0	0.5	0	0	0	0.5	0	0
2x-2y	25	2540	0.7	639	453	2900	0.7	741	509	0	0.7	0	0	0	0.7	0	0
	40	2000	0.9	213	151	2190	0.9	247	169	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1050	592	9.60	7.20	1050	592	9.60	7.20	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes :
1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 24 x 32

Designation		W 14 x120								W 14 x109							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.52 %	0	2340	0.0	1080	789	2760	0.0	1330	928	2240	0.0	1020	752	2620	0.0	1240	883
Ar(in²)	11	2280	0.2	972	710	2670	0.2	1190	835	2180	0.2	915	677	2540	0.2	1120	795
= 4.00	13	2250	0.3	850	621	2640	0.3	1050	731	2160	0.3	801	592	2510	0.3	977	695
	17	2190	0.4	729	532	2560	0.4	895	626	2100	0.4	686	507	2430	0.4	837	596
4-# 9	21	2120	0.5	607	443	2460	0.5	746	522	2030	0.5	572	423	2330	0.5	698	497
2x-2y	25	2040	0.7	364	266	2340	0.7	447	313	1950	0.7	343	253	2220	0.7	418	298
	40	1640	0.9	121	88	1820	0.9	149	104	1560	0.9	114	84	1720	0.9	139	99
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		925	520	9.60	7.20	925	520	9.60	7.20	865	487	9.60	7.20	865	487	9.60	7.20
1.04 %	0	2470	0.0	1320	889	2890	0.0	1570	1030	2380	0.0	1260	852	2760	0.0	1480	983
Ar(in²)	11	2410	0.2	1190	800	2800	0.2	1410	925	2310	0.2	1130	767	2670	0.2	1330	884
= 8.00	13	2380	0.3	1040	700	2760	0.3	1240	809	2280	0.3	991	671	2630	0.3	1170	774
	17	2310	0.4	891	600	2670	0.4	1060	693	2220	0.4	849	575	2550	0.4	1000	663
8-# 9	21	2230	0.5	743	500	2560	0.5	882	578	2140	0.5	708	479	2440	0.5	834	553
4x-2y	25	2140	0.7	445	300	2440	0.7	529	346	2050	0.7	424	287	2320	0.7	500	331
	40	1700	0.9	148	100	1870	0.9	176	115	1620	0.9	141	95	1760	0.9	166	110
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		923	519	9.60	7.20	923	519	9.60	7.20	864	486	9.60	7.20	864	486	9.60	7.20
1.98 %	0	2720	0.0	1680	1160	3140	0.0	1930	1300	2630	0.0	1620	1130	3010	0.0	1840	1260
Ar(in²)	11	2640	0.2	1510	1050	3030	0.2	1740	1170	2540	0.2	1460	1010	2900	0.2	1660	1130
=15.24	13	2610	0.3	1320	914	2990	0.3	1520	1020	2510	0.3	1280	885	2860	0.3	1450	988
	17	2530	0.4	1140	784	2880	0.4	1300	877	2430	0.4	1090	759	2750	0.4	1240	847
12-#10	21	2430	0.5	946	653	2750	0.5	1090	731	2330	0.5	911	632	2630	0.5	1040	706
4x-4y	25	2320	0.7	567	392	2610	0.7	651	438	2220	0.7	546	379	2480	0.7	622	423
	40	1800	0.9	189	130	1950	0.9	217	146	1710	0.9	182	126	1840	0.9	207	141
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		920	517	9.60	7.20	920	517	9.60	7.20	861	484	9.60	7.20	861	484	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 24 x 32

Designation		W 12 x336								W 12 x305							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.52 %	0	4180	0.0	2240	1290	5360	0.0	2900	1590	3920	0.0	2060	1220	4980	0.0	2650	1480
Ar(in²)	11	4090	0.2	2020	1160	5210	0.2	2610	1430	3830	0.2	1850	1090	4850	0.2	2390	1330
= 4.00	13	4060	0.3	1770	1020	5160	0.3	2290	1250	3800	0.3	1620	956	4790	0.3	2090	1160
	17	3970	0.4	1510	872	5020	0.4	1960	1070	3720	0.4	1390	820	4660	0.4	1790	997
4-# 9	21	3870	0.5	1260	727	4850	0.5	1630	891	3620	0.5	1160	683	4500	0.5	1490	831
2x-2y	25	3740	0.7	756	436	4650	0.7	979	534	3500	0.7	695	410	4320	0.7	895	498
	40	3150	0.9	252	145	3730	0.9	326	178	2930	0.9	231	136	3450	0.9	298	166
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2060	1160	9.60	7.20	2060	1160	9.60	7.20	1900	1070	9.60	7.20	1900	1070	9.60	7.20
1.04 %	0	4320	0.0	2480	1390	5500	0.0	3140	1680	4050	0.0	2300	1310	5120	0.0	2890	1580
Ar(in²)	11	4230	0.2	2230	1250	5340	0.2	2830	1520	3960	0.2	2070	1180	4980	0.2	2600	1420
= 8.00	13	4190	0.3	1960	1100	5280	0.3	2470	1330	3930	0.3	1810	1030	4920	0.3	2280	1240
	17	4100	0.4	1680	939	5140	0.4	2120	1140	3840	0.4	1550	887	4780	0.4	1950	1060
8-# 9	21	3980	0.5	1400	782	4960	0.5	1770	947	3730	0.5	1290	739	4610	0.5	1630	886
4x-2y	25	3850	0.7	837	469	4750	0.7	1060	568	3610	0.7	776	443	4420	0.7	976	532
	40	3220	0.9	279	156	3780	0.9	353	189	3010	0.9	258	147	3510	0.9	325	177
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2060	1160	9.60	7.20	2060	1160	9.60	7.20	1900	1070	9.60	7.20	1900	1070	9.60	7.20
1.98 %	0	4570	0.0	2840	1660	5740	0.0	3500	1950	4300	0.0	2660	1580	5370	0.0	3250	1850
Ar(in²)	11	4460	0.2	2560	1500	5580	0.2	3150	1760	4200	0.2	2390	1430	5210	0.2	2930	1660
=15.24	13	4420	0.3	2240	1310	5510	0.3	2760	1540	4160	0.3	2090	1250	5150	0.3	2560	1450
	17	4320	0.4	1920	1120	5350	0.4	2360	1320	4060	0.4	1800	1070	5000	0.4	2200	1250
12-#10	21	4190	0.5	1600	934	5160	0.5	1970	1100	3940	0.5	1500	891	4810	0.5	1830	1040
4x-4y	25	4050	0.7	959	560	4930	0.7	1180	659	3800	0.7	897	534	4600	0.7	1100	623
	40	3350	0.9	319	186	3890	0.9	393	219	3130	0.9	299	178	3610	0.9	365	207
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		2060	1160	9.60	7.20	2060	1160	9.60	7.20	1890	1070	9.60	7.20	1890	1070	9.60	7.20
3.25 %	0	4900	0.0	3180	2050	6080	0.0	3840	2340	4630	0.0	3000	1970	5700	0.0	3590	2230
Ar(in²)	11	4780	0.2	2860	1850	5890	0.2	3460	2110	4510	0.2	2700	1780	5520	0.2	3230	2010
=24.96	13	4730	0.3	2510	1610	5820	0.3	3020	1840	4470	0.3	2360	1550	5450	0.3	2830	1760
	17	4610	0.4	2150	1380	5640	0.4	2590	1580	4350	0.4	2030	1330	5280	0.4	2420	1510
16-#11	21	4470	0.5	1790	1150	5420	0.5	2160	1320	4210	0.5	1690	1110	5070	0.5	2020	1260
4x-6y	25	4300	0.7	1070	691	5170	0.7	1300	790	4050	0.7	1010	665	4830	0.7	1210	754
	40	3510	0.9	358	230	4020	0.9	432	263	3290	0.9	337	221	3740	0.9	404	251
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		2060	1160	9.60	7.20	2060	1160	9.60	7.20	1890	1060	9.60	7.20	1890	1060	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 32

Designation		W 12 x279								W 12 x252							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.52 %	0	3690	0.0	1900	1150	4670	0.0	2440	1390	3470	0.0	1750	1090	4350	0.0	2230	1300
Ar(in^2)	11	3610	0.2	1710	1030	4540	0.2	2200	1250	3390	0.2	1580	977	4230	0.2	2010	1170
= 4.00	13	3580	0.3	1500	905	4490	0.3	1920	1090	3360	0.3	1380	855	4180	0.3	1760	1020
	17	3500	0.4	1290	776	4360	0.4	1650	936	3280	0.4	1180	733	4060	0.4	1510	876
4-# 9	21	3410	0.5	1070	646	4210	0.5	1370	780	3190	0.5	985	610	3920	0.5	1260	730
2x-2y	25	3290	0.7	642	388	4040	0.7	823	468	3080	0.7	591	366	3750	0.7	753	438
	40	2750	0.9	214	129	3220	0.9	274	156	2570	0.9	197	122	2990	0.9	251	146
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1760	990	9.60	7.20	1760	990	9.60	7.20	1620	911	9.60	7.20	1620	911	9.60	7.20
1.04 %	0	3830	0.0	2140	1250	4800	0.0	2680	1490	3600	0.0	1990	1190	4480	0.0	2470	1400
Ar(in^2)	11	3740	0.2	1930	1120	4670	0.2	2410	1340	3520	0.2	1790	1070	4350	0.2	2230	1260
= 8.00	13	3710	0.3	1690	983	4610	0.3	2110	1170	3490	0.3	1570	933	4300	0.3	1950	1100
	17	3620	0.4	1450	843	4480	0.4	1810	1000	3410	0.4	1350	800	4180	0.4	1670	942
8-# 9	21	3520	0.5	1210	702	4320	0.5	1510	835	3310	0.5	1120	666	4030	0.5	1390	785
4x-2y	25	3400	0.7	723	421	4140	0.7	904	501	3190	0.7	672	400	3850	0.7	835	471
	40	2820	0.9	241	140	3280	0.9	301	167	2640	0.9	224	133	3040	0.9	278	157
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1760	989	9.60	7.20	1760	989	9.60	7.20	1620	910	9.60	7.20	1620	910	9.60	7.20
1.98 %	0	4080	0.0	2500	1520	5050	0.0	3040	1760	3850	0.0	2350	1460	4730	0.0	2830	1670
Ar(in^2)	11	3980	0.2	2250	1370	4900	0.2	2740	1580	3750	0.2	2120	1310	4590	0.2	2550	1500
=15.24	13	3940	0.3	1970	1200	4840	0.3	2390	1380	3720	0.3	1850	1150	4530	0.3	2230	1310
	17	3840	0.4	1690	1030	4700	0.4	2050	1190	3620	0.4	1590	982	4390	0.4	1910	1130
12-#10	21	3730	0.5	1410	854	4520	0.5	1710	988	3510	0.5	1320	819	4230	0.5	1590	938
4x-4y	25	3590	0.7	845	512	4320	0.7	1030	592	3380	0.7	794	491	4030	0.7	956	562
	40	2950	0.9	281	170	3380	0.9	341	197	2760	0.9	264	163	3140	0.9	318	187
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1760	988	9.60	7.20	1760	988	9.60	7.20	1620	909	9.60	7.20	1620	909	9.60	7.20
3.25 %	0	4410	0.0	2850	1910	5380	0.0	3380	2140	4180	0.0	2690	1840	5060	0.0	3170	2060
Ar(in^2)	11	4290	0.2	2560	1720	5210	0.2	3040	1930	4070	0.2	2430	1660	4900	0.2	2860	1850
=24.96	13	4250	0.3	2240	1500	5140	0.3	2660	1690	4020	0.3	2120	1450	4830	0.3	2500	1620
	17	4140	0.4	1920	1290	4980	0.4	2280	1450	3920	0.4	1820	1240	4680	0.4	2140	1390
16-#11	21	4000	0.5	1600	1070	4780	0.5	1900	1210	3780	0.5	1520	1040	4490	0.5	1790	1160
4x-6y	25	3840	0.7	960	643	4550	0.7	1140	723	3630	0.7	909	622	4260	0.7	1070	693
	40	3100	0.9	320	214	3500	0.9	380	241	2910	0.9	303	207	3260	0.9	357	231
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1750	985	9.60	7.20	1750	985	9.60	7.20	1610	907	9.60	7.20	1610	907	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in^2)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 24 x 32

Designation		W 12 x230								W 12 x210							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.52 %	0	3280	0.0	1630	1030	4090	0.0	2070	1230	3110	0.0	1520	986	3840	0.0	1920	1160
Ar(in^2)	11	3200	0.2	1470	931	3970	0.2	1860	1110	3040	0.2	1370	887	3730	0.2	1730	1050
= 4.00	13	3180	0.3	1280	814	3920	0.3	1630	966	3010	0.3	1200	776	3690	0.3	1510	916
	17	3100	0.4	1100	698	3810	0.4	1400	828	2940	0.4	1030	665	3590	0.4	1300	785
4-# 9	21	3020	0.5	916	582	3680	0.5	1160	690	2850	0.5	854	554	3460	0.5	1080	654
2x-2y	25	2910	0.7	550	349	3520	0.7	698	414	2750	0.7	512	332	3310	0.7	647	392
	40	2420	0.9	183	116	2790	0.9	232	138	2280	0.9	170	110	2620	0.9	215	130
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1510	847	9.60	7.20	1510	847	9.60	7.20	1400	787	9.60	7.20	1400	787	9.60	7.20
1.04 %	0	3420	0.0	1870	1130	4220	0.0	2310	1330	3240	0.0	1760	1090	3980	0.0	2160	1260
Ar(in^2)	11	3340	0.2	1680	1020	4100	0.2	2080	1190	3170	0.2	1580	976	3860	0.2	1940	1140
= 8.00	13	3300	0.3	1470	893	4050	0.3	1820	1040	3140	0.3	1390	854	3820	0.3	1700	994
	17	3230	0.4	1260	765	3930	0.4	1560	895	3060	0.4	1190	732	3700	0.4	1460	852
8-# 9	21	3130	0.5	1050	637	3790	0.5	1300	746	2970	0.5	989	610	3570	0.5	1210	710
4x-2y	25	3020	0.7	631	382	3620	0.7	779	447	2860	0.7	593	366	3410	0.7	728	426
	40	2490	0.9	210	127	2850	0.9	259	149	2340	0.9	197	122	2670	0.9	242	142
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1500	846	9.60	7.20	1500	846	9.60	7.20	1400	786	9.60	7.20	1400	786	9.60	7.20
1.98 %	0	3660	0.0	2230	1410	4470	0.0	2670	1600	3490	0.0	2120	1360	4230	0.0	2520	1530
Ar(in^2)	11	3570	0.2	2010	1260	4330	0.2	2400	1440	3400	0.2	1910	1220	4090	0.2	2270	1380
=15.24	13	3530	0.3	1760	1110	4280	0.3	2100	1260	3370	0.3	1670	1070	4040	0.3	1980	1210
	17	3440	0.4	1510	948	4150	0.4	1800	1080	3280	0.4	1430	915	3920	0.4	1700	1030
12-#10	21	3330	0.5	1260	790	3980	0.5	1500	898	3170	0.5	1190	763	3760	0.5	1420	862
4x-4y	25	3210	0.7	753	474	3800	0.7	901	539	3050	0.7	715	457	3580	0.7	850	517
	40	2600	0.9	251	158	2950	0.9	300	179	2460	0.9	238	152	2770	0.9	283	172
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1500	844	9.60	7.20	1500	844	9.60	7.20	1400	785	9.60	7.20	1400	785	9.60	7.20
3.25 %	0	4000	0.0	2570	1790	4800	0.0	3010	1990	3820	0.0	2460	1750	4560	0.0	2860	1920
Ar(in^2)	11	3880	0.2	2320	1610	4640	0.2	2710	1790	3710	0.2	2220	1570	4400	0.2	2580	1730
=24.96	13	3840	0.3	2030	1410	4580	0.3	2370	1560	3670	0.3	1940	1370	4340	0.3	2250	1510
	17	3740	0.4	1740	1210	4430	0.4	2030	1340	3570	0.4	1660	1180	4200	0.4	1930	1300
16-#11	21	3600	0.5	1450	1010	4240	0.5	1690	1120	3440	0.5	1390	981	4020	0.5	1610	1080
4x-6y	25	3450	0.7	868	605	4030	0.7	1020	670	3290	0.7	831	588	3810	0.7	965	648
	40	2750	0.9	289	201	3060	0.9	338	223	2600	0.9	277	196	2880	0.9	321	216
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1500	842	9.60	7.20	1500	842	9.60	7.20	1390	783	9.60	7.20	1390	783	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in^2)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 24 x 32

Designation		W 12 x190								W 12 x170							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.52 %	0	2930	0.0	1410	936	3600	0.0	1770	1100	2770	0.0	1300	887	3360	0.0	1620	1040
Ar(in²)	11	2860	0.2	1270	843	3490	0.2	1590	990	2700	0.2	1170	798	3260	0.2	1460	933
= 4.00	13	2840	0.3	1110	737	3450	0.3	1390	866	2670	0.3	1030	698	3220	0.3	1280	817
	17	2770	0.4	951	632	3350	0.4	1190	743	2610	0.4	879	598	3130	0.4	1090	700
4-# 9	21	2690	0.5	792	527	3230	0.5	995	619	2530	0.5	732	499	3010	0.5	912	583
2x-2y	25	2590	0.7	475	316	3090	0.7	597	371	2430	0.7	439	299	2880	0.7	547	350
	40	2130	0.9	158	105	2440	0.9	199	123	2000	0.9	146	99	2260	0.9	182	116
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1290	727	9.60	7.20	1290	727	9.60	7.20	1190	668	9.60	7.20	1190	668	9.60	7.20
1.04 %	0	3070	0.0	1650	1040	3730	0.0	2010	1200	2900	0.0	1540	986	3500	0.0	1860	1140
Ar(in²)	11	2990	0.2	1490	932	3620	0.2	1810	1080	2830	0.2	1390	888	3390	0.2	1680	1020
= 8.00	13	2960	0.3	1300	816	3580	0.3	1580	945	2800	0.3	1220	777	3350	0.3	1470	895
	17	2890	0.4	1110	699	3470	0.4	1360	810	2730	0.4	1040	666	3250	0.4	1260	767
8-# 9	21	2800	0.5	928	583	3340	0.5	1130	675	2640	0.5	868	555	3120	0.5	1050	639
4x-2y	25	2700	0.7	557	349	3190	0.7	678	405	2540	0.7	521	333	2980	0.7	628	383
	40	2200	0.9	185	116	2490	0.9	226	135	2060	0.9	173	111	2310	0.9	209	127
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1290	726	9.60	7.20	1290	726	9.60	7.20	1190	667	9.60	7.20	1190	667	9.60	7.20
1.98 %	0	3320	0.0	2010	1310	3980	0.0	2370	1470	3150	0.0	1900	1260	3740	0.0	2220	1410
Ar(in²)	11	3230	0.2	1810	1180	3850	0.2	2130	1320	3060	0.2	1710	1130	3620	0.2	2000	1270
=15.24	13	3190	0.3	1580	1030	3800	0.3	1870	1160	3030	0.3	1500	990	3570	0.3	1750	1110
	17	3110	0.4	1360	882	3680	0.4	1600	992	2940	0.4	1290	849	3460	0.4	1500	950
12-#10	21	3000	0.5	1130	735	3530	0.5	1330	827	2840	0.5	1070	707	3310	0.5	1250	791
4x-4y	25	2880	0.7	678	441	3360	0.7	800	496	2720	0.7	642	424	3150	0.7	750	475
	40	2310	0.9	226	147	2580	0.9	266	165	2170	0.9	214	141	2400	0.9	250	158
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1290	724	9.60	7.20	1290	724	9.60	7.20	1180	666	9.60	7.20	1180	666	9.60	7.20
3.25 %	0	3650	0.0	2350	1700	4310	0.0	2710	1860	3480	0.0	2250	1650	4080	0.0	2570	1800
Ar(in²)	11	3540	0.2	2120	1530	4160	0.2	2440	1670	3370	0.2	2020	1480	3930	0.2	2310	1620
=24.96	13	3500	0.3	1850	1340	4100	0.3	2140	1460	3330	0.3	1770	1300	3870	0.3	2020	1410
	17	3400	0.4	1590	1150	3960	0.4	1830	1250	3230	0.4	1520	1110	3740	0.4	1730	1210
16-#11	21	3270	0.5	1320	954	3790	0.5	1530	1050	3110	0.5	1260	926	3570	0.5	1440	1010
4x-6y	25	3120	0.7	794	572	3590	0.7	915	627	2960	0.7	758	555	3370	0.7	865	606
	40	2450	0.9	264	190	2700	0.9	305	209	2300	0.9	252	185	2510	0.9	288	202
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1280	722	9.60	7.20	1280	722	9.60	7.20	1180	664	9.60	7.20	1180	664	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 32

Designation		W 12 x152								W 12 x136							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.52 %	0	2610	0.0	1210	841	3140	0.0	1490	979	2470	0.0	1120	797	2950	0.0	1370	925
Ar(in²)	11	2550	0.2	1090	757	3050	0.2	1340	881	2410	0.2	1010	717	2860	0.2	1240	832
= 4.00	13	2520	0.3	951	662	3010	0.3	1170	771	2380	0.3	884	628	2820	0.3	1080	728
	17	2460	0.4	815	567	2920	0.4	1010	661	2320	0.4	757	538	2740	0.4	926	624
4-# 9	21	2380	0.5	679	473	2810	0.5	838	550	2250	0.5	631	448	2630	0.5	772	520
2x-2y	25	2290	0.7	407	283	2690	0.7	503	330	2160	0.7	378	269	2510	0.7	463	312
	40	1870	0.9	135	94	2100	0.9	167	110	1750	0.9	126	89	1960	0.9	154	104
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1090	615	9.60	7.20	1090	615	9.60	7.20	1010	566	9.60	7.20	1010	566	9.60	7.20
1.04 %	0	2750	0.0	1450	940	3280	0.0	1730	1080	2610	0.0	1360	897	3080	0.0	1610	1020
Ar(in²)	11	2680	0.2	1300	846	3180	0.2	1560	971	2540	0.2	1230	807	2980	0.2	1450	922
= 8.00	13	2650	0.3	1140	740	3140	0.3	1360	849	2510	0.3	1070	706	2950	0.3	1270	807
	17	2580	0.4	978	635	3040	0.4	1170	728	2440	0.4	920	605	2850	0.4	1090	691
8-# 9	21	2490	0.5	815	529	2920	0.5	974	606	2360	0.5	767	504	2740	0.5	907	576
4x-2y	25	2390	0.7	489	317	2780	0.7	584	364	2260	0.7	460	302	2610	0.7	544	345
	40	1930	0.9	163	105	2150	0.9	194	121	1810	0.9	153	100	2010	0.9	181	115
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1090	614	9.60	7.20	1090	614	9.60	7.20	1010	565	9.60	7.20	1010	565	9.60	7.20
1.98 %	0	3000	0.0	1810	1210	3530	0.0	2090	1350	2860	0.0	1720	1170	3330	0.0	1970	1300
Ar(in²)	11	2910	0.2	1630	1090	3410	0.2	1880	1220	2770	0.2	1550	1050	3220	0.2	1780	1170
=15.24	13	2880	0.3	1430	954	3360	0.3	1650	1060	2740	0.3	1360	920	3170	0.3	1550	1020
	17	2790	0.4	1220	818	3250	0.4	1410	911	2660	0.4	1160	789	3060	0.4	1330	874
12-#10	21	2690	0.5	1020	682	3110	0.5	1180	759	2560	0.5	969	657	2930	0.5	1110	729
4x-4y	25	2580	0.7	610	409	2950	0.7	706	455	2440	0.7	581	394	2780	0.7	666	437
	40	2040	0.9	203	136	2240	0.9	235	151	1920	0.9	193	131	2090	0.9	222	145
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1090	612	9.60	7.20	1090	612	9.60	7.20	1000	564	9.60	7.20	1000	564	9.60	7.20
3.25 %	0	3330	0.0	2150	1600	3860	0.0	2430	1740	3190	0.0	2070	1560	3660	0.0	2320	1680
Ar(in²)	11	3220	0.2	1940	1440	3720	0.2	2190	1560	3080	0.2	1860	1400	3520	0.2	2080	1520
=24.96	13	3180	0.3	1690	1260	3660	0.3	1920	1370	3040	0.3	1630	1230	3470	0.3	1820	1330
	17	3080	0.4	1450	1080	3530	0.4	1640	1170	2940	0.4	1390	1050	3340	0.4	1560	1140
16-#11	21	2960	0.5	1210	901	3360	0.5	1370	977	2820	0.5	1160	876	3180	0.5	1300	947
4x-6y	25	2810	0.7	726	540	3180	0.7	821	586	2680	0.7	697	526	3000	0.7	781	568
	40	2170	0.9	242	180	2350	0.9	273	195	2040	0.9	232	175	2190	0.9	260	189
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1090	610	9.60	7.20	1090	610	9.60	7.20	999	562	9.60	7.20	999	562	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 3.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 32

Designation		W 12 x120								W 12 x106							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.52 %	0	2340	0.0	1040	753	2760	0.0	1260	871	2220	0.0	971	713	2590	0.0	1160	823
Ar(in^2)	11	2280	0.2	937	678	2670	0.2	1130	784	2160	0.2	874	641	2510	0.2	1050	741
= 4.00	13	2250	0.3	820	593	2640	0.3	992	686	2130	0.3	765	561	2480	0.3	916	648
	17	2190	0.4	703	508	2560	0.4	851	588	2080	0.4	655	481	2400	0.4	785	555
4-# 9	21	2120	0.5	585	424	2460	0.5	709	490	2010	0.5	546	401	2300	0.5	654	463
2x-2y	25	2040	0.7	351	254	2340	0.7	425	294	1920	0.7	327	240	2190	0.7	392	277
	40	1640	0.9	117	84	1820	0.9	141	98	1540	0.9	109	80	1690	0.9	130	92
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		925	520	9.60	7.20	925	520	9.60	7.20	851	478	9.60	7.20	851	478	9.60	7.20
1.04 %	0	2470	0.0	1280	853	2890	0.0	1500	971	2360	0.0	1210	813	2730	0.0	1410	923
Ar(in^2)	11	2410	0.2	1150	768	2800	0.2	1350	874	2290	0.2	1090	732	2640	0.2	1260	830
= 8.00	13	2380	0.3	1010	672	2760	0.3	1180	764	2260	0.3	954	640	2600	0.3	1110	726
	17	2310	0.4	865	576	2670	0.4	1010	655	2200	0.4	818	549	2510	0.4	948	623
8-# 9	21	2230	0.5	721	480	2560	0.5	844	546	2120	0.5	682	457	2410	0.5	790	519
4x-2y	25	2140	0.7	432	288	2440	0.7	506	327	2020	0.7	409	274	2290	0.7	474	311
	40	1700	0.9	144	96	1870	0.9	168	109	1600	0.9	136	91	1740	0.9	158	103
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		923	519	9.60	7.20	923	519	9.60	7.20	849	478	9.60	7.20	849	478	9.60	7.20
1.98 %	0	2720	0.0	1640	1130	3140	0.0	1860	1240	2600	0.0	1570	1090	2970	0.0	1770	1190
Ar(in^2)	11	2640	0.2	1480	1010	3030	0.2	1680	1120	2520	0.2	1420	977	2870	0.2	1590	1080
=15.24	13	2610	0.3	1290	886	2990	0.3	1470	978	2490	0.3	1240	854	2820	0.3	1390	940
	17	2530	0.4	1110	760	2880	0.4	1260	838	2410	0.4	1060	732	2720	0.4	1190	806
12-#10	21	2430	0.5	924	633	2750	0.5	1050	699	2310	0.5	884	610	2600	0.5	993	672
4x-4y	25	2320	0.7	554	380	2610	0.7	628	419	2200	0.7	530	366	2450	0.7	595	403
	40	1800	0.9	184	126	1950	0.9	209	139	1690	0.9	176	122	1820	0.9	198	134
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		920	517	9.60	7.20	920	517	9.60	7.20	847	476	9.60	7.20	847	476	9.60	7.20
3.25 %	0	3050	0.0	1990	1520	3470	0.0	2200	1630	2930	0.0	1920	1480	3310	0.0	2110	1580
Ar(in^2)	11	2950	0.2	1790	1360	3340	0.2	1980	1470	2830	0.2	1720	1330	3170	0.2	1900	1430
=24.96	13	2910	0.3	1560	1190	3280	0.3	1740	1290	2790	0.3	1510	1160	3120	0.3	1660	1250
	17	2810	0.4	1340	1020	3160	0.4	1490	1100	2690	0.4	1290	996	2990	0.4	1420	1070
16-#11	21	2690	0.5	1120	852	3000	0.5	1240	917	2570	0.5	1080	830	2840	0.5	1190	891
4x-6y	25	2550	0.7	670	511	2820	0.7	743	550	2430	0.7	646	498	2670	0.7	711	534
	40	1920	0.9	223	170	2040	0.9	247	183	1800	0.9	215	166	1910	0.9	237	178
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		917	515	9.60	7.20	917	515	9.60	7.20	843	474	9.60	7.20	843	474	9.60	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in^2)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 28

Designation		W 14 x426								W 14 x398							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.51 %	0	4970	0.0	2850	1830	6460	0.0	3790	2290	4740	0.0	2670	1750	6130	0.0	3530	2170
Ar(in²)	11	4890	0.2	2570	1650	6330	0.2	3410	2060	4670	0.2	2400	1570	6010	0.2	3180	1960
= 4.00	13	4870	0.3	2250	1440	6280	0.3	2980	1810	4640	0.3	2100	1370	5960	0.3	2780	1710
	17	4790	0.4	1920	1240	6160	0.4	2560	1550	4570	0.4	1800	1180	5850	0.4	2390	1470
4-# 9	21	4700	0.5	1600	1030	6010	0.5	2130	1290	4480	0.5	1500	981	5700	0.5	1990	1220
2x-2y	25	4590	0.7	962	618	5830	0.7	1280	773	4380	0.7	900	589	5530	0.7	1190	733
	40	4060	0.9	320	206	4970	0.9	426	257	3870	0.9	300	196	4710	0.9	397	244
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1940	1940	8.40	8.40	1940	1940	8.40	8.40	1830	1830	8.40	8.40	1830	1830	8.40	8.40
1.02 %	0	5110	0.0	3010	2040	6590	0.0	3940	2500	4870	0.0	2820	1950	6270	0.0	3690	2380
Ar(in²)	11	5030	0.2	2710	1830	6460	0.2	3550	2250	4800	0.2	2540	1750	6140	0.2	3320	2140
= 8.00	13	5000	0.3	2370	1600	6410	0.3	3100	1970	4770	0.3	2220	1540	6090	0.3	2910	1870
	17	4920	0.4	2030	1370	6280	0.4	2660	1690	4690	0.4	1910	1320	5970	0.4	2490	1600
8-# 9	21	4820	0.5	1690	1150	6130	0.5	2220	1400	4600	0.5	1590	1100	5820	0.5	2080	1340
2x-4y	25	4710	0.7	1010	687	5940	0.7	1330	842	4490	0.7	953	657	5640	0.7	1250	801
	40	4150	0.9	338	229	5050	0.9	443	280	3950	0.9	317	219	4790	0.9	415	267
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1940	1940	8.40	8.40	1940	1940	8.40	8.40	1830	1830	8.40	8.40	1830	1830	8.40	8.40
2.30 %	0	5450	0.0	3370	2510	6940	0.0	4300	2970	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	5360	0.2	3030	2260	6790	0.2	3870	2680	0	0.2	0	0	0	0.2	0	0
=18.00	13	5320	0.3	2650	1980	6730	0.3	3390	2340	0	0.3	0	0	0	0.3	0	0
	17	5230	0.4	2270	1700	6590	0.4	2910	2010	0	0.4	0	0	0	0.4	0	0
8-#14	21	5130	0.5	1900	1410	6420	0.5	2420	1670	0	0.5	0	0	0	0.5	0	0
2x-4y	25	5000	0.7	1140	848	6210	0.7	1450	1000	0	0.7	0	0	0	0.7	0	0
	40	4370	0.9	379	282	5230	0.9	484	334	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1940	1940	8.40	8.40	1940	1940	8.40	8.40	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 28

Designation		W 14 x370								W 14 x342							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.51 %	0	4500	0.0	2490	1660	5800	0.0	3290	2060	4270	0.0	2310	1580	5470	0.0	3050	1940
Ar(in²)	11	4440	0.2	2240	1500	5690	0.2	2960	1850	4210	0.2	2080	1420	5360	0.2	2740	1750
= 4.00	13	4410	0.3	1960	1310	5640	0.3	2590	1620	4180	0.3	1820	1240	5320	0.3	2400	1530
	17	4340	0.4	1680	1120	5530	0.4	2220	1390	4110	0.4	1560	1070	5220	0.4	2060	1310
4-# 9	21	4260	0.5	1400	934	5390	0.5	1850	1160	4030	0.5	1300	887	5090	0.5	1710	1090
2x-2y	25	4160	0.7	840	560	5230	0.7	1110	693	3940	0.7	780	532	4930	0.7	1030	654
	40	3670	0.9	280	186	4450	0.9	370	231	3470	0.9	260	177	4190	0.9	342	218
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1720	1720	8.40	8.40	1720	1720	8.40	8.40	1620	1620	8.40	8.40	1620	1620	8.40	8.40
1.02 %	0	4640	0.0	2700	1800	5940	0.0	3490	2190	4410	0.0	2520	1710	5610	0.0	3250	2070
Ar(in²)	11	4570	0.2	2430	1620	5820	0.2	3150	1970	4340	0.2	2270	1540	5500	0.2	2930	1870
= 8.00	13	4540	0.3	2120	1410	5770	0.3	2750	1720	4310	0.3	1980	1350	5450	0.3	2560	1630
	17	4470	0.4	1820	1210	5650	0.4	2360	1480	4240	0.4	1700	1160	5340	0.4	2190	1400
8-# 9	21	4380	0.5	1520	1010	5510	0.5	1970	1230	4160	0.5	1420	963	5200	0.5	1830	1170
4x-2y	25	4270	0.7	909	606	5340	0.7	1180	739	4050	0.7	849	578	5040	0.7	1100	699
	40	3750	0.9	303	202	4530	0.9	393	246	3560	0.9	283	192	4270	0.9	365	233
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1720	1720	8.40	8.40	1720	1720	8.40	8.40	1610	1610	8.40	8.40	1610	1610	8.40	8.40
2.04 %	0	4910	0.0	3060	2220	6210	0.0	3860	2620	4680	0.0	2880	2140	5880	0.0	3610	2500
Ar(in²)	11	4830	0.2	2750	2000	6080	0.2	3470	2360	4600	0.2	2590	1930	5760	0.2	3250	2250
=16.00	13	4800	0.3	2410	1750	6030	0.3	3040	2060	4570	0.3	2270	1690	5710	0.3	2840	1970
	17	4720	0.4	2060	1500	5900	0.4	2600	1770	4490	0.4	1940	1450	5590	0.4	2440	1690
4-#18	21	4620	0.5	1720	1250	5740	0.5	2170	1470	4400	0.5	1620	1200	5440	0.5	2030	1410
2x-2y	25	4500	0.7	1030	750	5560	0.7	1300	883	4280	0.7	972	722	5260	0.7	1220	844
	40	3920	0.9	343	250	4670	0.9	433	294	3720	0.9	324	240	4410	0.9	406	281
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1720	1720	8.40	8.40	1720	1720	8.40	8.40	1610	1610	8.40	8.40	1610	1610	8.40	8.40
2.55 %	0	5050	0.0	3140	2270	6350	0.0	3940	2660	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	4960	0.2	2830	2040	6210	0.2	3550	2400	0	0.2	0	0	0	0.2	0	0
=20.00	13	4930	0.3	2470	1790	6160	0.3	3100	2100	0	0.3	0	0	0	0.3	0	0
	17	4840	0.4	2120	1530	6020	0.4	2660	1800	0	0.4	0	0	0	0.4	0	0
20-# 9	21	4740	0.5	1770	1280	5860	0.5	2220	1500	0	0.5	0	0	0	0.5	0	0
6x-6y	25	4620	0.7	1060	765	5670	0.7	1330	898	0	0.7	0	0	0	0.7	0	0
	40	4010	0.9	353	255	4750	0.9	443	299	0	0.9	0	0	0	0.9	0	0
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1720	1720	8.40	8.40	1720	1720	8.40	8.40	0	0	.00	.00	0	0	.00	.00
4.08 %	0	5460	0.0	3430	2990	6760	0.0	4230	3390	5230	0.0	3260	2910	6430	0.0	3990	3270
Ar(in²)	11	5360	0.2	3090	2690	6600	0.2	3810	3050	5130	0.2	2930	2620	6280	0.2	3590	2940
=32.00	13	5320	0.3	2700	2360	6540	0.3	3330	2670	5090	0.3	2560	2290	6220	0.3	3140	2570
	17	5220	0.4	2320	2020	6390	0.4	2860	2290	4990	0.4	2200	1960	6070	0.4	2690	2210
8-#18	21	5100	0.5	1930	1680	6200	0.5	2380	1900	4870	0.5	1830	1640	5900	0.5	2240	1840
2x-4y	25	4950	0.7	1160	1010	5990	0.7	1430	1140	4730	0.7	1100	981	5690	0.7	1350	1100
	40	4250	0.9	386	336	4960	0.9	475	380	4050	0.9	366	327	4690	0.9	448	367
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1720	1720	8.40	8.40	1720	1720	8.40	8.40	1610	1610	8.40	8.40	1610	1610	8.40	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 28

Designation		W 14 x311								W 14 x283							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.51 %	0	3990	0.0	2120	1490	5080	0.0	2780	1810	3760	0.0	1950	1410	4750	0.0	2550	1700
Ar(in²)	11	3930	0.2	1910	1340	4980	0.2	2500	1630	3700	0.2	1750	1270	4650	0.2	2290	1530
= 4.00	13	3900	0.3	1670	1170	4940	0.3	2190	1430	3670	0.3	1530	1110	4610	0.3	2010	1340
	17	3840	0.4	1430	1000	4840	0.4	1880	1220	3610	0.4	1320	950	4520	0.4	1720	1150
4-# 9	21	3770	0.5	1190	837	4720	0.5	1570	1020	3540	0.5	1100	792	4410	0.5	1430	957
2x-2y	25	3680	0.7	715	502	4570	0.7	939	612	3450	0.7	657	475	4270	0.7	860	574
	40	3230	0.9	238	167	3880	0.9	313	204	3030	0.9	219	158	3620	0.9	286	191
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1480	1480	8.40	8.40	1480	1480	8.40	8.40	1370	1370	8.40	8.40	1370	1370	8.40	8.40
1.02 %	0	4130	0.0	2330	1620	5220	0.0	2990	1950	3890	0.0	2150	1540	4890	0.0	2750	1840
Ar(in²)	11	4060	0.2	2090	1460	5110	0.2	2690	1750	3830	0.2	1940	1390	4780	0.2	2480	1650
= 8.00	13	4040	0.3	1830	1280	5070	0.3	2350	1530	3800	0.3	1700	1220	4740	0.3	2170	1450
	17	3970	0.4	1570	1100	4960	0.4	2020	1310	3740	0.4	1450	1040	4640	0.4	1860	1240
8-# 9	21	3890	0.5	1310	912	4830	0.5	1680	1100	3660	0.5	1210	868	4520	0.5	1550	1030
4x-2y	25	3790	0.7	784	547	4680	0.7	1010	657	3570	0.7	727	520	4380	0.7	929	620
	40	3320	0.9	261	182	3950	0.9	336	219	3110	0.9	242	173	3690	0.9	309	206
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1480	1480	8.40	8.40	1480	1480	8.40	8.40	1370	1370	8.40	8.40	1370	1370	8.40	8.40
2.04 %	0	4400	0.0	2690	2050	5490	0.0	3350	2380	4170	0.0	2520	1970	5160	0.0	3120	2270
Ar(in²)	11	4330	0.2	2420	1850	5370	0.2	3010	2140	4090	0.2	2270	1780	5040	0.2	2810	2040
=16.00	13	4300	0.3	2120	1620	5320	0.3	2640	1870	4060	0.3	1980	1550	5000	0.3	2450	1780
	17	4220	0.4	1810	1380	5210	0.4	2260	1600	3990	0.4	1700	1330	4890	0.4	2100	1530
4-#18	21	4130	0.5	1510	1150	5070	0.5	1880	1340	3900	0.5	1420	1110	4750	0.5	1750	1270
2x-2y	25	4020	0.7	907	692	4900	0.7	1130	802	3790	0.7	849	665	4590	0.7	1050	764
	40	3480	0.9	302	230	4100	0.9	376	267	3280	0.9	283	221	3830	0.9	350	254
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1480	1480	8.40	8.40	1480	1480	8.40	8.40	1370	1370	8.40	8.40	1370	1370	8.40	8.40
3.18 %	0	4710	0.0	3070	2240	5800	0.0	3730	2560	4470	0.0	2900	2160	5470	0.0	3500	2450
Ar(in²)	11	4620	0.2	2760	2010	5660	0.2	3360	2310	4390	0.2	2610	1940	5340	0.2	3150	2210
=24.96	13	4590	0.3	2420	1760	5610	0.3	2940	2020	4350	0.3	2280	1700	5290	0.3	2760	1930
	17	4500	0.4	2070	1510	5480	0.4	2520	1730	4270	0.4	1960	1460	5160	0.4	2360	1650
16-#11	21	4390	0.5	1730	1260	5320	0.5	2100	1440	4170	0.5	1630	1210	5010	0.5	1970	1380
6x-4y	25	4270	0.7	1040	755	5140	0.7	1260	864	4040	0.7	979	728	4830	0.7	1180	827
	40	3660	0.9	345	251	4260	0.9	419	288	3460	0.9	326	242	3990	0.9	393	275
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1480	1480	8.40	8.40	1480	1480	8.40	8.40	1370	1370	8.40	8.40	1370	1370	8.40	8.40
3.98 %	0	4920	0.0	3190	2550	6010	0.0	3850	2870	4690	0.0	3030	2470	5680	0.0	3620	2760
Ar(in²)	11	4830	0.2	2870	2290	5870	0.2	3470	2590	4590	0.2	2720	2220	5540	0.2	3260	2490
=31.20	13	4790	0.3	2510	2010	5810	0.3	3030	2260	4560	0.3	2380	1940	5490	0.3	2850	2170
	17	4690	0.4	2150	1720	5670	0.4	2600	1940	4460	0.4	2040	1670	5350	0.4	2440	1860
20-#11	21	4580	0.5	1800	1430	5500	0.5	2170	1620	4350	0.5	1700	1390	5190	0.5	2040	1550
6x-6y	25	4440	0.7	1080	859	5300	0.7	1300	969	4220	0.7	1020	833	5000	0.7	1220	932
	40	3780	0.9	359	286	4360	0.9	433	323	3580	0.9	340	277	4090	0.9	407	310
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1480	1480	8.40	8.40	1480	1480	8.40	8.40	1360	1360	8.40	8.40	1360	1360	8.40	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW

$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 28

Designation		W 14 x257								W 14 x233							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.51 %	0	3530	0.0	1790	1330	4430	0.0	2330	1600	3330	0.0	1650	1260	4140	0.0	2130	1510
Ar(in^2)	11	3480	0.2	1610	1200	4340	0.2	2100	1440	3270	0.2	1480	1140	4060	0.2	1920	1360
= 4.00	13	3450	0.3	1410	1050	4310	0.3	1840	1260	3250	0.3	1300	995	4020	0.3	1680	1190
	17	3400	0.4	1210	900	4220	0.4	1580	1080	3200	0.4	1110	852	3940	0.4	1440	1020
4-# 9	21	3330	0.5	1010	750	4110	0.5	1310	900	3130	0.5	925	710	3840	0.5	1200	847
2x-2y	25	3240	0.7	604	450	3980	0.7	787	540	3050	0.7	555	426	3710	0.7	720	508
	40	2840	0.9	201	150	3360	0.9	262	180	2660	0.9	185	142	3130	0.9	240	169
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1270	1270	8.40	8.40	1270	1270	8.40	8.40	1170	1170	8.40	8.40	1170	1170	8.40	8.40
1.02 %	0	3670	0.0	2000	1470	4570	0.0	2540	1730	3460	0.0	1850	1400	4280	0.0	2340	1640
Ar(in^2)	11	3610	0.2	1800	1320	4470	0.2	2280	1560	3400	0.2	1670	1260	4190	0.2	2110	1480
= 8.00	13	3580	0.3	1570	1160	4430	0.3	2000	1370	3380	0.3	1460	1100	4150	0.3	1840	1290
	17	3520	0.4	1350	991	4340	0.4	1710	1170	3320	0.4	1250	943	4060	0.4	1580	1110
8-# 9	21	3450	0.5	1120	826	4230	0.5	1430	975	3250	0.5	1040	786	3950	0.5	1320	923
4x-2y	25	3360	0.7	673	495	4090	0.7	856	585	3160	0.7	624	471	3820	0.7	789	553
	40	2920	0.9	224	165	3440	0.9	285	195	2740	0.9	208	157	3210	0.9	263	184
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1270	1270	8.40	8.40	1270	1270	8.40	8.40	1170	1170	8.40	8.40	1170	1170	8.40	8.40
2.04 %	0	3940	0.0	2360	1900	4840	0.0	2900	2160	3740	0.0	2210	1830	4550	0.0	2700	2070
Ar(in^2)	11	3870	0.2	2120	1710	4730	0.2	2610	1950	3670	0.2	1990	1640	4450	0.2	2430	1860
=16.00	13	3840	0.3	1860	1490	4690	0.3	2280	1700	3640	0.3	1740	1440	4410	0.3	2130	1630
	17	3770	0.4	1590	1280	4590	0.4	1960	1460	3570	0.4	1490	1230	4310	0.4	1820	1400
4-#18	21	3690	0.5	1330	1070	4460	0.5	1630	1220	3490	0.5	1250	1030	4180	0.5	1520	1160
2x-2y	25	3580	0.7	796	640	4300	0.7	979	730	3390	0.7	747	616	4040	0.7	912	698
	40	3080	0.9	265	213	3580	0.9	326	243	2900	0.9	249	205	3350	0.9	304	232
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1260	1260	8.40	8.40	1260	1260	8.40	8.40	1170	1170	8.40	8.40	1170	1170	8.40	8.40
3.18 %	0	4250	0.0	2740	2080	5150	0.0	3280	2350	4040	0.0	2600	2010	4860	0.0	3090	2260
Ar(in^2)	11	4170	0.2	2470	1880	5030	0.2	2960	2110	3960	0.2	2340	1810	4740	0.2	2780	2030
=24.96	13	4130	0.3	2160	1640	4980	0.3	2590	1850	3930	0.3	2050	1590	4690	0.3	2430	1780
	17	4050	0.4	1850	1410	4860	0.4	2220	1590	3850	0.4	1750	1360	4580	0.4	2080	1520
16-#11	21	3950	0.5	1540	1170	4710	0.5	1850	1320	3750	0.5	1460	1130	4440	0.5	1740	1270
6x-4y	25	3830	0.7	925	703	4540	0.7	1110	792	3630	0.7	876	679	4270	0.7	1040	761
	40	3260	0.9	308	234	3730	0.9	369	264	3070	0.9	292	226	3500	0.9	347	253
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1260	1260	8.40	8.40	1260	1260	8.40	8.40	1160	1160	8.40	8.40	1160	1160	8.40	8.40
3.98 %	0	4460	0.0	2870	2390	5360	0.0	3400	2660	4260	0.0	2730	2320	5070	0.0	3210	2570
Ar(in^2)	11	4370	0.2	2580	2160	5230	0.2	3060	2390	4160	0.2	2460	2090	4940	0.2	2890	2310
=31.20	13	4330	0.3	2260	1890	5180	0.3	2680	2090	4130	0.3	2150	1830	4890	0.3	2530	2020
	17	4240	0.4	1940	1620	5050	0.4	2300	1800	4040	0.4	1840	1570	4770	0.4	2160	1730
20-#11	21	4130	0.5	1620	1350	4890	0.5	1910	1500	3930	0.5	1540	1310	4610	0.5	1800	1440
6x-6y	25	4000	0.7	969	808	4700	0.7	1150	897	3800	0.7	921	784	4430	0.7	1080	866
	40	3380	0.9	323	269	3830	0.9	382	299	3190	0.9	307	261	3590	0.9	360	288
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1260	1260	8.40	8.40	1260	1260	8.40	8.40	1160	1160	8.40	8.40	1160	1160	8.40	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 28

Designation		W 14 x211								W 14 x193							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.51 %	0	3140	0.0	1510	1200	3880	0.0	1950	1420	2990	0.0	1410	1150	3660	0.0	1810	1350
Ar(in²)	11	3080	0.2	1360	1080	3790	0.2	1760	1280	2940	0.2	1270	1030	3580	0.2	1630	1220
= 4.00	13	3060	0.3	1190	943	3760	0.3	1540	1120	2910	0.3	1110	902	3550	0.3	1430	1070
	17	3010	0.4	1020	808	3680	0.4	1320	959	2860	0.4	950	773	3480	0.4	1220	914
4-# 9	21	2950	0.5	850	673	3590	0.5	1100	799	2800	0.5	792	644	3390	0.5	1020	762
2x-2y	25	2870	0.7	510	404	3470	0.7	659	479	2730	0.7	475	386	3280	0.7	612	457
	40	2500	0.9	170	134	2920	0.9	219	159	2370	0.9	158	128	2750	0.9	204	152
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1080	1080	8.40	8.40	1080	1080	8.40	8.40	1010	1010	8.40	8.40	1010	1010	8.40	8.40
1.02 %	0	3280	0.0	1720	1330	4010	0.0	2160	1560	3120	0.0	1610	1280	3800	0.0	2020	1490
Ar(in²)	11	3220	0.2	1550	1200	3930	0.2	1940	1400	3070	0.2	1450	1150	3720	0.2	1820	1340
= 8.00	13	3190	0.3	1350	1050	3890	0.3	1700	1230	3040	0.3	1270	1010	3680	0.3	1590	1170
	17	3140	0.4	1160	899	3810	0.4	1460	1050	2990	0.4	1090	864	3600	0.4	1360	1010
8-# 9	21	3070	0.5	966	749	3700	0.5	1220	875	2920	0.5	908	720	3500	0.5	1140	837
4x-2y	25	2980	0.7	579	449	3580	0.7	729	525	2840	0.7	544	432	3380	0.7	681	502
	40	2580	0.9	193	149	2990	0.9	243	175	2450	0.9	181	144	2820	0.9	227	167
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1080	1080	8.40	8.40	1080	1080	8.40	8.40	1010	1010	8.40	8.40	1010	1010	8.40	8.40
2.04 %	0	3550	0.0	2080	1760	4290	0.0	2520	1990	3400	0.0	1980	1710	4070	0.0	2380	1920
Ar(in²)	11	3480	0.2	1870	1590	4190	0.2	2270	1790	3330	0.2	1780	1540	3980	0.2	2150	1730
=16.00	13	3450	0.3	1640	1390	4150	0.3	1990	1560	3300	0.3	1560	1350	3940	0.3	1880	1510
	17	3390	0.4	1410	1190	4050	0.4	1700	1340	3240	0.4	1340	1150	3840	0.4	1610	1300
4-#18	21	3300	0.5	1170	991	3930	0.5	1420	1120	3160	0.5	1110	961	3730	0.5	1340	1080
2x-2y	25	3210	0.7	702	594	3790	0.7	851	670	3060	0.7	667	577	3600	0.7	804	647
	40	2740	0.9	234	198	3130	0.9	283	223	2600	0.9	222	192	2960	0.9	268	215
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1080	1080	8.40	8.40	1080	1080	8.40	8.40	1000	1000	8.40	8.40	1000	1000	8.40	8.40
3.18 %	0	3850	0.0	2470	1950	4590	0.0	2910	2170	3700	0.0	2360	1900	4380	0.0	2770	2100
Ar(in²)	11	3770	0.2	2220	1750	4480	0.2	2620	1950	3620	0.2	2130	1710	4270	0.2	2490	1890
=24.96	13	3740	0.3	1940	1530	4430	0.3	2290	1710	3590	0.3	1860	1490	4220	0.3	2180	1660
	17	3660	0.4	1660	1320	4320	0.4	1960	1470	3510	0.4	1590	1280	4120	0.4	1870	1420
16-#11	21	3570	0.5	1390	1100	4190	0.5	1630	1220	3420	0.5	1330	1070	3980	0.5	1560	1180
6x-4y	25	3450	0.7	832	657	4030	0.7	980	732	3310	0.7	797	640	3830	0.7	933	710
	40	2900	0.9	277	219	3280	0.9	326	244	2770	0.9	265	213	3100	0.9	311	236
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1070	1070	8.40	8.40	1070	1070	8.40	8.40	1000	1000	8.40	8.40	1000	1000	8.40	8.40
3.98 %	0	4070	0.0	2600	2260	4810	0.0	3030	2480	3920	0.0	2510	2210	4590	0.0	2890	2420
Ar(in²)	11	3980	0.2	2340	2030	4680	0.2	2730	2230	3830	0.2	2260	1990	4470	0.2	2610	2170
=31.20	13	3940	0.3	2050	1780	4630	0.3	2390	1950	3790	0.3	1970	1740	4420	0.3	2280	1900
	17	3850	0.4	1760	1530	4510	0.4	2050	1670	3700	0.4	1690	1490	4300	0.4	1950	1630
20-#11	21	3750	0.5	1470	1270	4360	0.5	1700	1400	3600	0.5	1410	1240	4160	0.5	1630	1360
6x-6y	25	3620	0.7	879	762	4190	0.7	1020	837	3470	0.7	846	745	3990	0.7	976	815
	40	3020	0.9	293	254	3380	0.9	340	279	2880	0.9	282	248	3200	0.9	325	271
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1070	1070	8.40	8.40	1070	1070	8.40	8.40	1000	1000	8.40	8.40	1000	1000	8.40	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 28

Designation		W 14 x176								W 14 x159							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.51 %	0	2840	0.0	1310	1090	3460	0.0	1680	1290	2690	0.0	1210	1040	3250	0.0	1540	1220
Ar(in²)	11	2790	0.2	1180	983	3380	0.2	1510	1160	2640	0.2	1090	935	3180	0.2	1390	1100
= 4.00	13	2770	0.3	1030	860	3350	0.3	1320	1010	2630	0.3	952	818	3150	0.3	1210	960
	17	2720	0.4	883	737	3280	0.4	1130	868	2580	0.4	816	701	3080	0.4	1040	823
4-# 9	21	2660	0.5	735	614	3190	0.5	943	723	2520	0.5	680	584	3000	0.5	866	686
2x-2y	25	2590	0.7	441	368	3090	0.7	566	434	2450	0.7	408	350	2900	0.7	520	411
	40	2240	0.9	147	122	2590	0.9	188	144	2110	0.9	136	116	2420	0.9	173	137
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		939	939	8.40	8.40	939	939	8.40	8.40	869	869	8.40	8.40	869	869	8.40	8.40
1.02 %	0	2980	0.0	1510	1230	3600	0.0	1880	1420	2830	0.0	1420	1170	3390	0.0	1750	1350
Ar(in²)	11	2920	0.2	1360	1100	3510	0.2	1690	1280	2780	0.2	1270	1060	3310	0.2	1570	1220
= 8.00	13	2900	0.3	1190	966	3480	0.3	1480	1120	2750	0.3	1110	924	3280	0.3	1380	1070
	17	2850	0.4	1020	828	3400	0.4	1270	959	2700	0.4	955	792	3200	0.4	1180	914
8-# 9	21	2780	0.5	851	690	3310	0.5	1060	799	2640	0.5	796	660	3110	0.5	982	761
4x-2y	25	2700	0.7	511	414	3200	0.7	635	479	2560	0.7	477	396	3000	0.7	589	457
	40	2320	0.9	170	138	2660	0.9	211	159	2190	0.9	159	132	2490	0.9	196	152
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		938	938	8.40	8.40	938	938	8.40	8.40	868	868	8.40	8.40	868	868	8.40	8.40
2.04 %	0	3250	0.0	1880	1660	3870	0.0	2250	1850	3100	0.0	1780	1600	3660	0.0	2110	1780
Ar(in²)	11	3190	0.2	1690	1490	3770	0.2	2020	1670	3040	0.2	1600	1440	3570	0.2	1900	1610
=16.00	13	3160	0.3	1480	1310	3740	0.3	1770	1460	3010	0.3	1400	1260	3530	0.3	1660	1400
	17	3100	0.4	1270	1120	3650	0.4	1520	1250	2950	0.4	1200	1080	3450	0.4	1420	1200
4-#18	21	3020	0.5	1060	932	3540	0.5	1260	1040	2870	0.5	1000	902	3340	0.5	1190	1000
2x-2y	25	2920	0.7	633	559	3410	0.7	758	624	2780	0.7	600	541	3210	0.7	712	602
	40	2470	0.9	211	186	2790	0.9	252	208	2340	0.9	200	180	2620	0.9	237	200
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		935	935	8.40	8.40	935	935	8.40	8.40	865	865	8.40	8.40	865	865	8.40	8.40
3.18 %	0	3560	0.0	2260	1840	4170	0.0	2630	2040	3410	0.0	2160	1790	3970	0.0	2490	1970
Ar(in²)	11	3480	0.2	2040	1660	4060	0.2	2370	1830	3330	0.2	1950	1610	3860	0.2	2250	1770
=24.96	13	3450	0.3	1780	1450	4020	0.3	2070	1600	3300	0.3	1700	1410	3820	0.3	1960	1550
	17	3370	0.4	1530	1250	3920	0.4	1780	1370	3220	0.4	1460	1210	3710	0.4	1680	1330
16-#11	21	3280	0.5	1270	1040	3790	0.5	1480	1150	3130	0.5	1220	1010	3590	0.5	1400	1110
6x-4y	25	3160	0.7	763	622	3640	0.7	887	687	3020	0.7	730	604	3440	0.7	842	664
	40	2640	0.9	254	207	2930	0.9	295	229	2500	0.9	243	201	2760	0.9	280	221
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		933	933	8.40	8.40	933	933	8.40	8.40	863	863	8.40	8.40	863	863	8.40	8.40
3.98 %	0	3770	0.0	2410	2160	4390	0.0	2760	2350	3620	0.0	2320	2100	4180	0.0	2630	2280
Ar(in²)	11	3680	0.2	2170	1940	4270	0.2	2490	2110	3530	0.2	2090	1890	4060	0.2	2370	2050
=31.20	13	3650	0.3	1900	1700	4220	0.3	2170	1850	3500	0.3	1830	1660	4010	0.3	2070	1800
	17	3560	0.4	1630	1460	4100	0.4	1860	1580	3410	0.4	1570	1420	3900	0.4	1780	1540
20-#11	21	3450	0.5	1360	1210	3960	0.5	1550	1320	3310	0.5	1300	1180	3760	0.5	1480	1280
6x-6y	25	3330	0.7	813	727	3800	0.7	932	792	3180	0.7	782	709	3600	0.7	888	769
	40	2740	0.9	271	242	3030	0.9	310	264	2600	0.9	260	236	2850	0.9	296	256
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		931	931	8.40	8.40	931	931	8.40	8.40	861	861	8.40	8.40	861	861	8.40	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 28 x 28

Designation		W 14 x145								W 14 x132							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.51 %	0	2580	0.0	1130	994	3090	0.0	1430	1160	2460	0.0	1060	937	2930	0.0	1330	1090
Ar(in²)	11	2530	0.2	1020	895	3020	0.2	1290	1050	2420	0.2	950	843	2860	0.2	1200	979
= 4.00	13	2510	0.3	889	783	2990	0.3	1130	916	2400	0.3	831	738	2830	0.3	1050	857
	17	2460	0.4	762	671	2920	0.4	965	785	2350	0.4	712	632	2770	0.4	896	734
4-# 9	21	2410	0.5	635	559	2840	0.5	804	654	2300	0.5	593	527	2690	0.5	747	612
2x-2y	25	2340	0.7	381	335	2750	0.7	482	392	2230	0.7	356	316	2600	0.7	448	367
	40	2010	0.9	127	111	2290	0.9	160	130	1910	0.9	118	105	2160	0.9	149	122
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		814	814	8.40	8.40	814	814	8.40	8.40	760	760	8.40	8.40	760	760	8.40	8.40
1.02 %	0	2710	0.0	1340	1130	3220	0.0	1640	1300	2600	0.0	1260	1070	3060	0.0	1530	1220
Ar(in²)	11	2660	0.2	1200	1020	3150	0.2	1470	1170	2550	0.2	1140	965	2990	0.2	1380	1100
= 8.00	13	2640	0.3	1050	889	3120	0.3	1290	1020	2530	0.3	993	844	2960	0.3	1210	963
	17	2590	0.4	901	762	3050	0.4	1100	876	2480	0.4	851	724	2890	0.4	1040	825
8-# 9	21	2520	0.5	751	635	2960	0.5	920	730	2410	0.5	709	603	2810	0.5	863	688
4x-2y	25	2450	0.7	450	381	2850	0.7	552	438	2340	0.7	425	362	2710	0.7	517	412
	40	2090	0.9	150	127	2360	0.9	184	146	1990	0.9	141	120	2230	0.9	172	137
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		813	813	8.40	8.40	813	813	8.40	8.40	759	759	8.40	8.40	759	759	8.40	8.40
2.04 %	0	2990	0.0	1700	1560	3500	0.0	2000	1730	2870	0.0	1630	1500	3340	0.0	1900	1650
Ar(in²)	11	2920	0.2	1530	1400	3410	0.2	1800	1560	2810	0.2	1460	1350	3250	0.2	1710	1490
=16.00	13	2900	0.3	1340	1230	3370	0.3	1580	1360	2780	0.3	1280	1180	3220	0.3	1490	1300
	17	2830	0.4	1150	1050	3290	0.4	1350	1170	2720	0.4	1100	1010	3130	0.4	1280	1120
4-#18	21	2760	0.5	956	877	3180	0.5	1130	972	2650	0.5	914	845	3030	0.5	1070	929
2x-2y	25	2670	0.7	573	526	3060	0.7	675	583	2560	0.7	548	507	2910	0.7	640	557
	40	2230	0.9	191	175	2490	0.9	225	194	2130	0.9	182	169	2360	0.9	213	185
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		811	811	8.40	8.40	811	811	8.40	8.40	757	757	8.40	8.40	757	757	8.40	8.40
3.18 %	0	3290	0.0	2080	1750	3800	0.0	2380	1920	3180	0.0	2010	1690	3640	0.0	2280	1840
Ar(in²)	11	3210	0.2	1880	1570	3700	0.2	2150	1720	3100	0.2	1810	1520	3540	0.2	2050	1660
=24.96	13	3180	0.3	1640	1380	3660	0.3	1880	1510	3070	0.3	1580	1330	3500	0.3	1800	1450
	17	3110	0.4	1410	1180	3560	0.4	1610	1290	3000	0.4	1360	1140	3400	0.4	1540	1240
16-#11	21	3010	0.5	1170	983	3430	0.5	1340	1080	2900	0.5	1130	950	3280	0.5	1280	1030
6x-4y	25	2910	0.7	703	589	3290	0.7	804	646	2790	0.7	678	570	3140	0.7	770	620
	40	2390	0.9	234	196	2620	0.9	268	215	2280	0.9	226	190	2490	0.9	256	206
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		808	808	8.40	8.40	808	808	8.40	8.40	754	754	8.40	8.40	754	754	8.40	8.40
3.98 %	0	3510	0.0	2250	2060	4020	0.0	2530	2230	3390	0.0	2170	2000	3860	0.0	2430	2150
Ar(in²)	11	3420	0.2	2020	1850	3900	0.2	2280	2000	3300	0.2	1960	1800	3740	0.2	2190	1940
=31.20	13	3380	0.3	1770	1620	3850	0.3	1990	1750	3270	0.3	1710	1580	3690	0.3	1910	1690
	17	3300	0.4	1520	1390	3740	0.4	1710	1500	3180	0.4	1470	1350	3580	0.4	1640	1450
20-#11	21	3190	0.5	1260	1160	3600	0.5	1420	1250	3080	0.5	1220	1130	3450	0.5	1370	1210
6x-6y	25	3070	0.7	757	695	3440	0.7	853	751	2950	0.7	733	675	3290	0.7	820	725
	40	2490	0.9	252	231	2710	0.9	284	250	2380	0.9	244	225	2580	0.9	273	241
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		806	806	8.40	8.40	806	806	8.40	8.40	753	753	8.40	8.40	753	753	8.40	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 28

Designation		W 14 x120								W 14 x109							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.51 %	0	2360	0.0	989	898	2780	0.0	1240	1040	2270	0.0	927	860	2650	0.0	1150	995
Ar(in^2)	11	2320	0.2	890	808	2720	0.2	1110	937	2220	0.2	834	774	2590	0.2	1040	895
= 4.00	13	2300	0.3	779	707	2690	0.3	973	819	2200	0.3	730	677	2560	0.3	906	783
	17	2250	0.4	668	606	2630	0.4	834	702	2160	0.4	626	580	2500	0.4	776	671
4-# 9	21	2200	0.5	556	505	2560	0.5	695	585	2110	0.5	521	483	2430	0.5	647	559
2x-2y	25	2130	0.7	334	303	2470	0.7	417	351	2040	0.7	313	290	2340	0.7	388	335
	40	1820	0.9	111	101	2050	0.9	139	117	1730	0.9	104	96	1940	0.9	129	111
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		712	712	8.40	8.40	712	712	8.40	8.40	667	667	8.40	8.40	667	667	8.40	8.40
1.02 %	0	2500	0.0	1200	1030	2920	0.0	1440	1180	2400	0.0	1130	995	2780	0.0	1360	1130
Ar(in^2)	11	2450	0.2	1080	930	2850	0.2	1300	1060	2350	0.2	1020	896	2720	0.2	1220	1020
= 8.00	13	2430	0.3	941	814	2820	0.3	1140	926	2330	0.3	892	784	2690	0.3	1070	890
	17	2380	0.4	807	697	2750	0.4	973	793	2280	0.4	765	672	2620	0.4	915	762
8-# 9	21	2320	0.5	672	581	2670	0.5	811	661	2220	0.5	637	560	2540	0.5	763	635
4x-2y	25	2240	0.7	403	348	2570	0.7	486	396	2150	0.7	382	336	2450	0.7	457	381
	40	1900	0.9	134	116	2110	0.9	162	132	1810	0.9	127	112	2000	0.9	152	127
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		711	711	8.40	8.40	711	711	8.40	8.40	666	666	8.40	8.40	666	666	8.40	8.40
2.04 %	0	2770	0.0	1560	1460	3190	0.0	1810	1610	2680	0.0	1500	1430	3060	0.0	1720	1560
Ar(in^2)	11	2710	0.2	1400	1320	3110	0.2	1630	1450	2610	0.2	1350	1280	2970	0.2	1550	1400
=16.00	13	2680	0.3	1230	1150	3080	0.3	1420	1260	2590	0.3	1180	1120	2940	0.3	1350	1230
	17	2620	0.4	1050	988	2990	0.4	1220	1080	2530	0.4	1010	963	2860	0.4	1160	1050
4-#18	21	2550	0.5	877	823	2900	0.5	1020	903	2450	0.5	842	802	2770	0.5	967	877
2x-2y	25	2460	0.7	526	494	2780	0.7	609	542	2360	0.7	505	481	2650	0.7	580	526
	40	2040	0.9	175	164	2240	0.9	203	180	1950	0.9	168	160	2130	0.9	193	175
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		709	709	8.40	8.40	709	709	8.40	8.40	664	664	8.40	8.40	664	664	8.40	8.40
3.18 %	0	3080	0.0	1940	1650	3500	0.0	2190	1790	2980	0.0	1880	1620	3360	0.0	2100	1750
Ar(in^2)	11	3000	0.2	1750	1490	3400	0.2	1970	1610	2900	0.2	1690	1450	3260	0.2	1890	1570
=24.96	13	2970	0.3	1530	1300	3360	0.3	1730	1410	2870	0.3	1480	1270	3220	0.3	1660	1380
	17	2890	0.4	1310	1120	3260	0.4	1480	1210	2800	0.4	1270	1090	3130	0.4	1420	1180
16-#11	21	2800	0.5	1090	929	3140	0.5	1230	1010	2700	0.5	1060	908	3010	0.5	1180	983
6x-4y	25	2690	0.7	656	557	3000	0.7	739	605	2600	0.7	635	545	2880	0.7	710	589
	40	2180	0.9	218	185	2370	0.9	246	201	2090	0.9	211	181	2250	0.9	236	196
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		706	706	8.40	8.40	706	706	8.40	8.40	661	661	8.40	8.40	661	661	8.40	8.40
3.98 %	0	3290	0.0	2110	1970	3710	0.0	2340	2100	3200	0.0	2060	1930	3580	0.0	2260	2060
Ar(in^2)	11	3200	0.2	1900	1770	3600	0.2	2110	1890	3100	0.2	1850	1730	3460	0.2	2040	1850
=31.20	13	3170	0.3	1660	1550	3550	0.3	1850	1660	3070	0.3	1620	1520	3420	0.3	1780	1620
	17	3080	0.4	1430	1330	3440	0.4	1580	1420	2980	0.4	1390	1300	3310	0.4	1530	1390
20-#11	21	2970	0.5	1190	1110	3310	0.5	1320	1180	2880	0.5	1160	1080	3180	0.5	1270	1160
6x-6y	25	2850	0.7	712	663	3160	0.7	791	710	2750	0.7	693	650	3030	0.7	764	695
	40	2280	0.9	237	221	2450	0.9	263	236	2180	0.9	231	216	2330	0.9	254	231
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		704	704	8.40	8.40	704	704	8.40	8.40	659	659	8.40	8.40	659	659	8.40	8.40

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 28 x 28

Designation		W 12 x336								W 12 x305							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.51 %	0	4210	0.0	2150	1410	5380	0.0	2800	1700	3940	0.0	1960	1330	5010	0.0	2560	1590
Ar(in²)	11	4140	0.2	1930	1270	5280	0.2	2520	1530	3880	0.2	1770	1200	4910	0.2	2300	1440
= 4.00	13	4120	0.3	1690	1110	5230	0.3	2210	1340	3850	0.3	1550	1050	4870	0.3	2010	1260
	17	4050	0.4	1450	951	5130	0.4	1890	1150	3790	0.4	1330	899	4770	0.4	1720	1080
4-# 9	21	3970	0.5	1210	792	5000	0.5	1580	957	3720	0.5	1100	749	4650	0.5	1440	896
2x-2y	25	3880	0.7	723	475	4850	0.7	946	574	3630	0.7	662	449	4510	0.7	862	538
	40	3410	0.9	241	158	4120	0.9	315	191	3190	0.9	220	149	3820	0.9	287	179
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1580	1580	8.40	8.40	1580	1580	8.40	8.40	1460	1460	8.40	8.40	1460	1460	8.40	8.40
1.02 %	0	4340	0.0	2350	1540	5520	0.0	3010	1840	4080	0.0	2170	1470	5140	0.0	2760	1730
Ar(in²)	11	4270	0.2	2120	1390	5410	0.2	2710	1650	4010	0.2	1950	1320	5040	0.2	2480	1560
= 8.00	13	4250	0.3	1850	1220	5360	0.3	2370	1450	3980	0.3	1710	1150	4990	0.3	2170	1360
	17	4180	0.4	1590	1040	5250	0.4	2030	1240	3920	0.4	1460	989	4890	0.4	1860	1170
8-# 9	21	4090	0.5	1320	868	5120	0.5	1690	1030	3840	0.5	1220	824	4760	0.5	1550	972
4x-2y	25	3990	0.7	793	520	4960	0.7	1020	619	3740	0.7	731	494	4610	0.7	931	583
	40	3500	0.9	264	173	4190	0.9	338	206	3270	0.9	243	164	3900	0.9	310	194
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1580	1580	8.40	8.40	1580	1580	8.40	8.40	1460	1460	8.40	8.40	1460	1460	8.40	8.40
2.04 %	0	4620	0.0	2710	1970	5790	0.0	3370	2270	4350	0.0	2530	1900	5420	0.0	3120	2160
Ar(in²)	11	4540	0.2	2440	1780	5670	0.2	3030	2040	4270	0.2	2280	1710	5300	0.2	2810	1940
=16.00	13	4510	0.3	2140	1550	5620	0.3	2650	1780	4240	0.3	1990	1490	5250	0.3	2460	1700
	17	4430	0.4	1830	1330	5500	0.4	2280	1530	4170	0.4	1710	1280	5140	0.4	2110	1460
4-#18	21	4330	0.5	1530	1110	5350	0.5	1900	1270	4080	0.5	1420	1070	5000	0.5	1760	1210
2x-2y	25	4220	0.7	915	665	5180	0.7	1140	764	3970	0.7	854	639	4830	0.7	1050	728
	40	3670	0.9	305	221	4340	0.9	379	254	3440	0.9	284	213	4040	0.9	351	242
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1580	1580	8.40	8.40	1580	1580	8.40	8.40	1460	1460	8.40	8.40	1460	1460	8.40	8.40
3.18 %	0	4920	0.0	3090	2160	6100	0.0	3750	2450	4660	0.0	2910	2080	5720	0.0	3500	2340
Ar(in²)	11	4830	0.2	2790	1940	5960	0.2	3380	2210	4570	0.2	2620	1870	5590	0.2	3150	2110
=24.96	13	4800	0.3	2440	1700	5910	0.3	2960	1930	4530	0.3	2290	1640	5540	0.3	2760	1850
	17	4710	0.4	2090	1460	5770	0.4	2530	1650	4450	0.4	1970	1400	5410	0.4	2370	1580
16-#11	21	4600	0.5	1740	1210	5610	0.5	2110	1380	4340	0.5	1640	1170	5250	0.5	1970	1320
6x-4y	25	4470	0.7	1040	728	5420	0.7	1270	827	4220	0.7	983	702	5070	0.7	1180	790
	40	3850	0.9	348	242	4500	0.9	422	275	3620	0.9	327	234	4200	0.9	394	263
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1580	1580	8.40	8.40	1580	1580	8.40	8.40	1450	1450	8.40	8.40	1450	1450	8.40	8.40
3.98 %	0	5140	0.0	3210	2470	6310	0.0	3870	2760	4870	0.0	3030	2390	5940	0.0	3620	2650
Ar(in²)	11	5040	0.2	2890	2220	6160	0.2	3480	2490	4770	0.2	2730	2150	5790	0.2	3260	2390
=31.20	13	5000	0.3	2530	1940	6110	0.3	3050	2170	4740	0.3	2390	1880	5740	0.3	2850	2090
	17	4900	0.4	2170	1670	5960	0.4	2610	1860	4640	0.4	2050	1610	5600	0.4	2450	1790
20-#11	21	4790	0.5	1810	1390	5790	0.5	2180	1550	4530	0.5	1710	1350	5430	0.5	2040	1490
6x-6y	25	4650	0.7	1080	833	5580	0.7	1310	931	4390	0.7	1020	807	5230	0.7	1220	895
	40	3970	0.9	361	277	4610	0.9	435	310	3740	0.9	341	269	4300	0.9	407	298
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1580	1580	8.40	8.40	1580	1580	8.40	8.40	1450	1450	8.40	8.40	1450	1450	8.40	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 28

Designation		W 12 x279								W 12 x252							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.51 %	0	3720	0.0	1810	1270	4690	0.0	2340	1500	3490	0.0	1660	1200	4370	0.0	2140	1420
Ar(in²)	11	3660	0.2	1630	1140	4600	0.2	2110	1350	3430	0.2	1490	1080	4280	0.2	1920	1270
= 4.00	13	3630	0.3	1420	997	4560	0.3	1840	1180	3410	0.3	1300	947	4250	0.3	1680	1110
	17	3570	0.4	1220	855	4470	0.4	1580	1020	3350	0.4	1120	811	4160	0.4	1440	955
4-# 9	21	3500	0.5	1020	712	4350	0.5	1320	845	3280	0.5	931	676	4050	0.5	1200	795
2x-2y	25	3420	0.7	610	427	4220	0.7	790	507	3200	0.7	559	405	3920	0.7	721	477
	40	2990	0.9	203	142	3570	0.9	263	169	2800	0.9	186	135	3320	0.9	240	159
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1350	1350	8.40	8.40	1350	1350	8.40	8.40	1250	1250	8.40	8.40	1250	1250	8.40	8.40
1.02 %	0	3850	0.0	2010	1400	4830	0.0	2550	1640	3630	0.0	1860	1340	4510	0.0	2340	1550
Ar(in²)	11	3790	0.2	1810	1260	4730	0.2	2290	1470	3560	0.2	1680	1200	4410	0.2	2110	1390
= 8.00	13	3760	0.3	1590	1100	4690	0.3	2010	1290	3540	0.3	1470	1050	4370	0.3	1840	1220
	17	3700	0.4	1360	945	4590	0.4	1720	1110	3480	0.4	1260	902	4280	0.4	1580	1050
8-# 9	21	3620	0.5	1130	788	4470	0.5	1430	921	3400	0.5	1050	752	4170	0.5	1320	871
4x-2y	25	3530	0.7	679	472	4330	0.7	859	552	3320	0.7	628	451	4030	0.7	790	522
	40	3080	0.9	226	157	3640	0.9	286	184	2880	0.9	209	150	3390	0.9	263	174
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1350	1350	8.40	8.40	1350	1350	8.40	8.40	1240	1240	8.40	8.40	1240	1240	8.40	8.40
2.04 %	0	4130	0.0	2380	1830	5100	0.0	2910	2070	3900	0.0	2230	1770	4780	0.0	2700	1980
Ar(in²)	11	4050	0.2	2140	1650	4990	0.2	2620	1860	3830	0.2	2000	1590	4670	0.2	2430	1780
=16.00	13	4020	0.3	1870	1440	4940	0.3	2290	1630	3800	0.3	1750	1390	4630	0.3	2130	1560
	17	3950	0.4	1600	1240	4830	0.4	1960	1400	3730	0.4	1500	1190	4530	0.4	1830	1340
4-#18	21	3860	0.5	1340	1030	4700	0.5	1640	1160	3640	0.5	1250	993	4400	0.5	1520	1110
2x-2y	25	3760	0.7	801	617	4540	0.7	981	697	3540	0.7	751	596	4250	0.7	912	667
	40	3240	0.9	267	205	3790	0.9	327	232	3050	0.9	250	198	3530	0.9	304	222
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1350	1350	8.40	8.40	1350	1350	8.40	8.40	1240	1240	8.40	8.40	1240	1240	8.40	8.40
3.18 %	0	4430	0.0	2760	2020	5410	0.0	3290	2250	4210	0.0	2610	1950	5090	0.0	3090	2160
Ar(in²)	11	4350	0.2	2480	1810	5280	0.2	2960	2030	4120	0.2	2350	1760	4970	0.2	2780	1950
=24.96	13	4310	0.3	2170	1590	5230	0.3	2590	1770	4090	0.3	2050	1540	4920	0.3	2430	1700
	17	4230	0.4	1860	1360	5110	0.4	2220	1520	4010	0.4	1760	1320	4800	0.4	2080	1460
16-#11	21	4130	0.5	1550	1130	4960	0.5	1850	1270	3910	0.5	1470	1100	4650	0.5	1740	1220
6x-4y	25	4010	0.7	931	680	4780	0.7	1110	760	3790	0.7	880	658	4480	0.7	1040	730
	40	3420	0.9	310	226	3940	0.9	370	253	3220	0.9	293	219	3680	0.9	347	243
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1350	1350	8.40	8.40	1350	1350	8.40	8.40	1240	1240	8.40	8.40	1240	1240	8.40	8.40
3.98 %	0	4650	0.0	2880	2330	5620	0.0	3410	2560	4420	0.0	2730	2260	5300	0.0	3210	2470
Ar(in²)	11	4550	0.2	2590	2090	5480	0.2	3070	2310	4330	0.2	2460	2040	5170	0.2	2880	2230
=31.20	13	4510	0.3	2270	1830	5430	0.3	2690	2020	4290	0.3	2150	1780	5120	0.3	2520	1950
	17	4420	0.4	1940	1570	5300	0.4	2300	1730	4200	0.4	1840	1530	4990	0.4	2160	1670
20-#11	21	4310	0.5	1620	1310	5130	0.5	1920	1440	4090	0.5	1540	1270	4830	0.5	1800	1390
6x-6y	25	4180	0.7	971	785	4940	0.7	1150	865	3960	0.7	921	763	4650	0.7	1080	835
	40	3540	0.9	323	261	4040	0.9	383	288	3340	0.9	307	254	3780	0.9	360	278
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1340	1340	8.40	8.40	1340	1340	8.40	8.40	1240	1240	8.40	8.40	1240	1240	8.40	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 28

Designation		W 12 x230								W 12 x210							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.51 %	0	3300	0.0	1540	1150	4110	0.0	1970	1340	3130	0.0	1420	1100	3870	0.0	1820	1280
Ar(in²)	11	3250	0.2	1380	1040	4020	0.2	1780	1210	3080	0.2	1280	991	3790	0.2	1640	1150
= 4.00	13	3230	0.3	1210	906	3990	0.3	1550	1060	3060	0.3	1120	867	3750	0.3	1440	1010
	17	3170	0.4	1040	776	3910	0.4	1330	907	3010	0.4	961	743	3680	0.4	1230	864
4-# 9	21	3110	0.5	863	647	3800	0.5	1110	756	2940	0.5	801	619	3580	0.5	1030	720
2x-2y	25	3030	0.7	518	388	3680	0.7	666	453	2860	0.7	480	371	3460	0.7	615	432
	40	2640	0.9	172	129	3110	0.9	222	151	2490	0.9	160	123	2910	0.9	205	144
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1160	1160	8.40	8.40	1160	1160	8.40	8.40	1080	1080	8.40	8.40	1080	1080	8.40	8.40
1.02 %	0	3440	0.0	1740	1290	4250	0.0	2180	1480	3270	0.0	1630	1240	4000	0.0	2030	1410
Ar(in²)	11	3380	0.2	1570	1160	4150	0.2	1960	1330	3210	0.2	1470	1110	3920	0.2	1830	1270
= 8.00	13	3360	0.3	1370	1010	4120	0.3	1720	1160	3190	0.3	1280	973	3880	0.3	1600	1110
	17	3300	0.4	1180	867	4030	0.4	1470	998	3130	0.4	1100	834	3800	0.4	1370	954
8-# 9	21	3230	0.5	979	722	3920	0.5	1230	831	3060	0.5	916	695	3690	0.5	1140	795
4x-2y	25	3140	0.7	587	433	3790	0.7	735	499	2980	0.7	550	417	3570	0.7	684	477
	40	2720	0.9	195	144	3180	0.9	245	166	2570	0.9	183	139	2990	0.9	228	159
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1160	1160	8.40	8.40	1160	1160	8.40	8.40	1080	1080	8.40	8.40	1080	1080	8.40	8.40
2.04 %	0	3710	0.0	2100	1710	4520	0.0	2540	1910	3540	0.0	1990	1670	4280	0.0	2390	1840
Ar(in²)	11	3640	0.2	1890	1540	4420	0.2	2290	1720	3470	0.2	1790	1500	4180	0.2	2150	1660
=16.00	13	3620	0.3	1660	1350	4380	0.3	2000	1500	3450	0.3	1570	1310	4140	0.3	1880	1450
	17	3550	0.4	1420	1160	4270	0.4	1720	1290	3380	0.4	1350	1120	4040	0.4	1610	1240
4-#18	21	3460	0.5	1180	964	4150	0.5	1430	1070	3300	0.5	1120	936	3920	0.5	1340	1040
2x-2y	25	3360	0.7	710	578	4010	0.7	857	643	3200	0.7	672	562	3780	0.7	806	622
	40	2880	0.9	236	192	3320	0.9	285	214	2730	0.9	224	187	3130	0.9	268	207
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1150	1150	8.40	8.40	1150	1150	8.40	8.40	1070	1070	8.40	8.40	1070	1070	8.40	8.40
3.18 %	0	4020	0.0	2490	1900	4830	0.0	2920	2090	3850	0.0	2380	1850	4580	0.0	2770	2030
Ar(in²)	11	3940	0.2	2240	1710	4710	0.2	2630	1880	3770	0.2	2140	1670	4470	0.2	2500	1830
=24.96	13	3910	0.3	1960	1500	4660	0.3	2300	1650	3740	0.3	1870	1460	4420	0.3	2180	1600
	17	3830	0.4	1680	1280	4550	0.4	1970	1410	3660	0.4	1600	1250	4310	0.4	1870	1370
16-#11	21	3730	0.5	1400	1070	4410	0.5	1640	1180	3560	0.5	1340	1040	4180	0.5	1560	1140
6x-4y	25	3610	0.7	839	641	4240	0.7	986	706	3450	0.7	802	624	4020	0.7	936	684
	40	3050	0.9	279	213	3470	0.9	328	235	2900	0.9	267	208	3270	0.9	312	228
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1150	1150	8.40	8.40	1150	1150	8.40	8.40	1070	1070	8.40	8.40	1070	1070	8.40	8.40
3.98 %	0	4230	0.0	2610	2210	5040	0.0	3040	2400	4060	0.0	2510	2160	4800	0.0	2890	2340
Ar(in²)	11	4140	0.2	2350	1990	4910	0.2	2740	2160	3970	0.2	2260	1950	4670	0.2	2600	2110
=31.20	13	4110	0.3	2060	1740	4860	0.3	2400	1890	3940	0.3	1970	1700	4620	0.3	2280	1840
	17	4020	0.4	1760	1490	4730	0.4	2050	1620	3850	0.4	1690	1460	4500	0.4	1950	1580
20-#11	21	3910	0.5	1470	1240	4580	0.5	1710	1350	3740	0.5	1410	1220	4350	0.5	1630	1320
6x-6y	25	3780	0.7	882	746	4400	0.7	1030	811	3610	0.7	846	729	4180	0.7	976	789
	40	3170	0.9	294	248	3570	0.9	342	270	3010	0.9	282	243	3370	0.9	325	263
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		1150	1150	8.40	8.40	1150	1150	8.40	8.40	1070	1070	8.40	8.40	1070	1070	8.40	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 28 x 28

Designation		W 12 x190								W 12 x170							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.51 %	0	2960	0.0	1320	1050	3620	0.0	1670	1220	2790	0.0	1210	1000	3380	0.0	1530	1150
Ar(in²)	11	2910	0.2	1180	946	3540	0.2	1510	1100	2740	0.2	1090	901	3310	0.2	1370	1040
= 4.00	13	2890	0.3	1040	828	3510	0.3	1320	958	2720	0.3	952	788	3280	0.3	1200	908
	17	2840	0.4	887	709	3440	0.4	1130	821	2670	0.4	816	675	3210	0.4	1030	778
4-# 9	21	2770	0.5	739	591	3350	0.5	941	684	2610	0.5	680	563	3120	0.5	859	648
2x-2y	25	2700	0.7	443	354	3240	0.7	565	410	2540	0.7	408	337	3020	0.7	515	389
	40	2340	0.9	147	118	2720	0.9	188	136	2190	0.9	136	112	2530	0.9	171	129
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		994	994	8.40	8.40	994	994	8.40	8.40	914	914	8.40	8.40	914	914	8.40	8.40
1.02 %	0	3090	0.0	1520	1190	3760	0.0	1880	1350	2930	0.0	1420	1140	3520	0.0	1730	1290
Ar(in²)	11	3040	0.2	1370	1070	3680	0.2	1690	1220	2870	0.2	1270	1020	3440	0.2	1560	1160
= 8.00	13	3020	0.3	1200	934	3640	0.3	1480	1060	2850	0.3	1110	894	3410	0.3	1370	1010
	17	2960	0.4	1030	800	3560	0.4	1270	912	2800	0.4	955	766	3330	0.4	1170	869
8-# 9	21	2890	0.5	855	667	3460	0.5	1060	760	2730	0.5	796	638	3240	0.5	975	724
4x-2y	25	2810	0.7	513	400	3350	0.7	634	456	2650	0.7	477	383	3130	0.7	585	434
	40	2420	0.9	171	133	2790	0.9	211	152	2270	0.9	159	127	2600	0.9	195	144
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		993	993	8.40	8.40	993	993	8.40	8.40	913	913	8.40	8.40	913	913	8.40	8.40
2.04 %	0	3370	0.0	1880	1620	4030	0.0	2240	1780	3200	0.0	1780	1570	3790	0.0	2100	1720
Ar(in²)	11	3300	0.2	1700	1450	3940	0.2	2020	1600	3130	0.2	1600	1410	3700	0.2	1890	1550
=16.00	13	3270	0.3	1480	1270	3900	0.3	1770	1400	3110	0.3	1400	1230	3670	0.3	1650	1350
	17	3210	0.4	1270	1090	3810	0.4	1510	1200	3040	0.4	1200	1060	3580	0.4	1420	1160
4-#18	21	3130	0.5	1060	908	3690	0.5	1260	1000	2960	0.5	1000	880	3470	0.5	1180	965
2x-2y	25	3030	0.7	635	545	3560	0.7	756	601	2870	0.7	600	528	3340	0.7	707	579
	40	2580	0.9	211	181	2930	0.9	252	200	2430	0.9	200	176	2730	0.9	235	193
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		990	990	8.40	8.40	990	990	8.40	8.40	911	911	8.40	8.40	911	911	8.40	8.40
3.18 %	0	3670	0.0	2270	1800	4340	0.0	2630	1970	3510	0.0	2160	1750	4100	0.0	2480	1900
Ar(in²)	11	3590	0.2	2040	1620	4230	0.2	2360	1770	3430	0.2	1950	1580	3990	0.2	2230	1710
=24.96	13	3560	0.3	1790	1420	4180	0.3	2070	1550	3400	0.3	1700	1380	3950	0.3	1950	1500
	17	3490	0.4	1530	1220	4080	0.4	1770	1330	3320	0.4	1460	1180	3850	0.4	1670	1280
16-#11	21	3390	0.5	1280	1010	3940	0.5	1480	1110	3220	0.5	1220	985	3720	0.5	1390	1070
6x-4y	25	3280	0.7	765	608	3790	0.7	886	663	3110	0.7	729	591	3570	0.7	836	642
	40	2740	0.9	255	202	3070	0.9	295	221	2590	0.9	243	197	2870	0.9	278	214
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		988	988	8.40	8.40	988	988	8.40	8.40	908	908	8.40	8.40	908	908	8.40	8.40
3.98 %	0	3890	0.0	2400	2110	4550	0.0	2750	2280	3720	0.0	2300	2060	4310	0.0	2610	2210
Ar(in²)	11	3800	0.2	2160	1900	4430	0.2	2470	2050	3630	0.2	2070	1860	4190	0.2	2350	1990
=31.20	13	3760	0.3	1890	1660	4380	0.3	2160	1790	3590	0.3	1810	1630	4150	0.3	2050	1740
	17	3680	0.4	1620	1430	4260	0.4	1850	1540	3510	0.4	1550	1390	4030	0.4	1760	1490
20-#11	21	3570	0.5	1350	1190	4120	0.5	1550	1280	3400	0.5	1290	1160	3890	0.5	1470	1250
6x-6y	25	3440	0.7	810	713	3950	0.7	927	768	3280	0.7	776	696	3730	0.7	879	747
	40	2850	0.9	270	237	3160	0.9	309	256	2690	0.9	258	232	2970	0.9	293	249
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		986	986	8.40	8.40	986	986	8.40	8.40	906	906	8.40	8.40	906	906	8.40	8.40

Notes : 1. $Cex = Pex(KxLx)^2/10000.$ (kip-ft²), $Cey = Pey(KyLy)^2/10000.$ (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 28 x 28

Designation		W 12 x152								W 12 x136							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.51 %	0	2640	0.0	1120	954	3170	0.0	1400	1090	2500	0.0	1030	909	2970	0.0	1280	1040
Ar(in²)	11	2590	0.2	1000	858	3100	0.2	1260	985	2450	0.2	926	818	2900	0.2	1150	935
= 4.00	13	2570	0.3	878	751	3070	0.3	1100	862	2430	0.3	811	716	2880	0.3	1010	818
	17	2520	0.4	752	644	3000	0.4	943	739	2380	0.4	695	613	2810	0.4	863	701
4-# 9	21	2460	0.5	627	536	2920	0.5	785	615	2330	0.5	579	511	2730	0.5	719	584
2x-2y	25	2390	0.7	376	322	2820	0.7	471	369	2260	0.7	347	306	2640	0.7	431	350
	40	2060	0.9	125	107	2360	0.9	157	123	1940	0.9	115	102	2200	0.9	143	116
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		841	841	8.40	8.40	841	841	8.40	8.40	776	776	8.40	8.40	776	776	8.40	8.40
1.02 %	0	2770	0.0	1320	1090	3300	0.0	1600	1230	2630	0.0	1240	1040	3110	0.0	1490	1170
Ar(in²)	11	2720	0.2	1190	980	3230	0.2	1440	1110	2580	0.2	1110	940	3030	0.2	1340	1060
= 8.00	13	2700	0.3	1040	857	3200	0.3	1260	968	2560	0.3	973	822	3010	0.3	1170	925
	17	2650	0.4	891	735	3120	0.4	1080	829	2510	0.4	834	705	2940	0.4	1000	792
8-# 9	21	2580	0.5	743	612	3030	0.5	901	691	2450	0.5	695	587	2850	0.5	835	660
4x-2y	25	2500	0.7	445	367	2930	0.7	540	414	2370	0.7	417	352	2750	0.7	501	396
	40	2140	0.9	148	122	2420	0.9	180	138	2010	0.9	139	117	2270	0.9	167	132
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		840	840	8.40	8.40	840	840	8.40	8.40	774	774	8.40	8.40	774	774	8.40	8.40
2.04 %	0	3050	0.0	1680	1520	3580	0.0	1970	1660	2910	0.0	1600	1470	3380	0.0	1850	1600
Ar(in²)	11	2980	0.2	1520	1370	3490	0.2	1770	1490	2840	0.2	1440	1330	3290	0.2	1660	1440
=16.00	13	2950	0.3	1330	1200	3450	0.3	1550	1310	2820	0.3	1260	1160	3260	0.3	1460	1260
	17	2890	0.4	1140	1030	3370	0.4	1330	1120	2750	0.4	1080	995	3180	0.4	1250	1080
4-#18	21	2810	0.5	947	854	3260	0.5	1110	933	2680	0.5	899	829	3070	0.5	1040	902
2x-2y	25	2720	0.7	568	512	3140	0.7	663	559	2590	0.7	539	497	2950	0.7	623	541
	40	2290	0.9	189	170	2560	0.9	221	186	2160	0.9	179	165	2390	0.9	207	180
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		838	838	8.40	8.40	838	838	8.40	8.40	772	772	8.40	8.40	772	772	8.40	8.40
3.18 %	0	3350	0.0	2070	1710	3880	0.0	2350	1840	3210	0.0	1980	1660	3690	0.0	2230	1790
Ar(in²)	11	3270	0.2	1860	1540	3780	0.2	2110	1660	3130	0.2	1780	1500	3580	0.2	2010	1610
=24.96	13	3240	0.3	1630	1340	3740	0.3	1850	1450	3100	0.3	1560	1310	3540	0.3	1760	1410
	17	3170	0.4	1400	1150	3640	0.4	1590	1250	3030	0.4	1340	1120	3440	0.4	1510	1210
16-#11	21	3070	0.5	1160	959	3510	0.5	1320	1040	2930	0.5	1120	934	3320	0.5	1260	1010
6x-4y	25	2960	0.7	697	575	3370	0.7	792	622	2830	0.7	669	560	3180	0.7	753	604
	40	2440	0.9	232	191	2690	0.9	264	207	2310	0.9	223	186	2530	0.9	251	201
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		835	835	8.40	8.40	835	835	8.40	8.40	769	769	8.40	8.40	769	769	8.40	8.40
3.98 %	0	3570	0.0	2210	2020	4100	0.0	2480	2160	3430	0.0	2130	1970	3900	0.0	2370	2100
Ar(in²)	11	3480	0.2	1990	1820	3980	0.2	2230	1940	3340	0.2	1920	1780	3780	0.2	2130	1890
=31.20	13	3440	0.3	1740	1590	3930	0.3	1950	1700	3300	0.3	1680	1550	3740	0.3	1860	1660
	17	3350	0.4	1490	1360	3820	0.4	1670	1460	3210	0.4	1440	1330	3630	0.4	1600	1420
20-#11	21	3250	0.5	1240	1130	3680	0.5	1400	1210	3110	0.5	1200	1110	3490	0.5	1330	1180
6x-6y	25	3130	0.7	746	680	3520	0.7	837	727	2990	0.7	718	666	3340	0.7	798	709
	40	2550	0.9	248	226	2780	0.9	279	242	2410	0.9	239	222	2610	0.9	266	236
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		834	834	8.40	8.40	834	834	8.40	8.40	768	768	8.40	8.40	768	768	8.40	8.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 28 x 28

Designation		W 12 x120								W							
Fy (ksi)		36				50											
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy								
.51 %	0	2360	0.0	948	864	2780	0.0	1170	985								
Ar(in²)	11	2320	0.2	854	777	2720	0.2	1050	886								
= 4.00	13	2300	0.3	747	680	2690	0.3	919	775								
	17	2250	0.4	640	583	2630	0.4	788	665								
4-# 9	21	2200	0.5	533	486	2560	0.5	656	554								
2x-2y	25	2130	0.7	320	291	2470	0.7	394	332								
	40	1820	0.9	106	97	2050	0.9	131	110								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		712	712	8.40	8.40	712	712	8.40	8.40								
1.02 %	0	2500	0.0	1150	999	2920	0.0	1370	1120								
Ar(in²)	11	2450	0.2	1040	899	2850	0.2	1240	1010								
= 8.00	13	2430	0.3	909	787	2820	0.3	1080	882								
	17	2380	0.4	779	674	2750	0.4	927	756								
8-# 9	21	2320	0.5	649	562	2670	0.5	772	630								
4x-2y	25	2240	0.7	389	337	2570	0.7	463	378								
	40	1900	0.9	129	112	2110	0.9	154	126								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		711	711	8.40	8.40	711	711	8.40	8.40								
2.04 %	0	2770	0.0	1520	1430	3190	0.0	1740	1550								
Ar(in²)	11	2710	0.2	1370	1290	3110	0.2	1560	1400								
=16.00	13	2680	0.3	1200	1130	3080	0.3	1370	1220								
	17	2620	0.4	1020	965	2990	0.4	1170	1050								
4-#18	21	2550	0.5	853	804	2900	0.5	976	871								
2x-2y	25	2460	0.7	512	482	2780	0.7	586	523								
	40	2040	0.9	170	160	2240	0.9	195	174								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		709	709	8.40	8.40	709	709	8.40	8.40								
3.18 %	0	3080	0.0	1900	1620	3500	0.0	2120	1740								
Ar(in²)	11	3000	0.2	1710	1460	3400	0.2	1910	1560								
=24.96	13	2970	0.3	1500	1270	3360	0.3	1670	1370								
	17	2890	0.4	1280	1090	3260	0.4	1430	1170								
16-#11	21	2800	0.5	1070	909	3140	0.5	1190	976								
6x-4y	25	2690	0.7	641	545	3000	0.7	715	586								
	40	2180	0.9	213	181	2370	0.9	238	195								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		706	706	8.40	8.40	706	706	8.40	8.40								
3.98 %	0	3290	0.0	2050	1930	3710	0.0	2260	2050								
Ar(in²)	11	3200	0.2	1850	1740	3600	0.2	2030	1840								
=31.20	13	3170	0.3	1620	1520	3550	0.3	1780	1610								
	17	3080	0.4	1390	1300	3440	0.4	1530	1380								
20-#11	21	2970	0.5	1150	1090	3310	0.5	1270	1150								
6x-6y	25	2850	0.7	692	651	3160	0.7	762	691								
	40	2280	0.9	230	217	2450	0.9	254	230								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 18 in		704	704	8.40	8.40	704	704	8.40	8.40								

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD ϕc = 0.85 f'c : 3.0 ksi NW

ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 28

Designation		W 14 x426								W 14 x398							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.47 %	0	4770	0.0	2770	1630	6260	0.0	3700	2090	4540	0.0	2590	1550	5930	0.0	3450	1970
Ar(in²)	11	4670	0.2	2490	1470	6090	0.2	3330	1880	4450	0.2	2330	1390	5770	0.2	3100	1770
= 3.16	13	4640	0.3	2180	1280	6030	0.3	2910	1650	4410	0.3	2040	1220	5710	0.3	2720	1550
	17	4540	0.4	1870	1100	5870	0.4	2500	1410	4320	0.4	1750	1040	5560	0.4	2330	1330
4-# 8	21	4430	0.5	1560	917	5680	0.5	2080	1180	4210	0.5	1460	869	5380	0.5	1940	1110
2x-2y	25	4300	0.7	935	550	5460	0.7	1250	705	4080	0.7	873	521	5170	0.7	1160	664
	40	3650	0.9	311	183	4410	0.9	416	235	3460	0.9	291	173	4170	0.9	387	221
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1910	1400	8.40	7.20	1910	1400	8.40	7.20	1800	1320	8.40	7.20	1800	1320	8.40	7.20
.93 %	0	4880	0.0	2920	1750	6360	0.0	3850	2210	4640	0.0	2740	1670	6030	0.0	3600	2090
Ar(in²)	11	4780	0.2	2630	1580	6190	0.2	3460	1990	4550	0.2	2460	1500	5870	0.2	3240	1880
= 6.24	13	4740	0.3	2300	1380	6130	0.3	3030	1740	4510	0.3	2160	1310	5810	0.3	2830	1650
	17	4640	0.4	1970	1180	5970	0.4	2600	1490	4420	0.4	1850	1120	5660	0.4	2430	1410
4-#11	21	4520	0.5	1640	985	5770	0.5	2170	1240	4300	0.5	1540	937	5470	0.5	2020	1180
2x-2y	25	4380	0.7	985	591	5530	0.7	1300	746	4170	0.7	924	562	5240	0.7	1210	705
	40	3710	0.9	328	197	4450	0.9	433	248	3520	0.9	308	187	4210	0.9	404	235
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1910	1400	8.40	7.20	1910	1400	8.40	7.20	1800	1320	8.40	7.20	1800	1320	8.40	7.20
1.86 %	0	5090	0.0	3230	1910	6580	0.0	4160	2370	4860	0.0	3050	1830	6250	0.0	3910	2250
Ar(in²)	11	4980	0.2	2910	1720	6390	0.2	3750	2130	4750	0.2	2750	1640	6070	0.2	3520	2030
=12.48	13	4940	0.3	2550	1510	6320	0.3	3280	1870	4710	0.3	2400	1440	6010	0.3	3080	1770
	17	4830	0.4	2180	1290	6150	0.4	2810	1600	4610	0.4	2060	1230	5840	0.4	2640	1520
8-#11	21	4700	0.5	1820	1080	5940	0.5	2340	1330	4480	0.5	1720	1030	5640	0.5	2200	1270
4x-2y	25	4550	0.7	1090	645	5690	0.7	1400	800	4340	0.7	1030	616	5400	0.7	1320	759
	40	3820	0.9	363	215	4550	0.9	468	266	3640	0.9	343	205	4310	0.9	439	253
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1910	1400	8.40	7.20	1910	1400	8.40	7.20	1800	1320	8.40	7.20	1800	1320	8.40	7.20
2.79 %	0	5300	0.0	3450	2170	6790	0.0	4380	2630	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	5180	0.2	3100	1950	6600	0.2	3940	2360	0	0.2	0	0	0	0.2	0	0
=18.72	13	5140	0.3	2720	1710	6520	0.3	3450	2070	0	0.3	0	0	0	0.3	0	0
	17	5020	0.4	2330	1460	6340	0.4	2950	1770	0	0.4	0	0	0	0.4	0	0
12-#11	21	4880	0.5	1940	1220	6110	0.5	2460	1480	0	0.5	0	0	0	0.5	0	0
4x-4y	25	4720	0.7	1160	731	5850	0.7	1480	886	0	0.7	0	0	0	0.7	0	0
	40	3940	0.9	387	243	4640	0.9	492	295	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1910	1400	8.40	7.20	1910	1400	8.40	7.20	0	0	.00	.00	0	0	.00	.00
3.71 %	0	5510	0.0	3570	2420	7000	0.0	4490	2880	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	5390	0.2	3210	2180	6800	0.2	4050	2590	0	0.2	0	0	0	0.2	0	0
=24.96	13	5340	0.3	2810	1910	6720	0.3	3540	2270	0	0.3	0	0	0	0.3	0	0
	17	5210	0.4	2410	1640	6520	0.4	3030	1950	0	0.4	0	0	0	0.4	0	0
16-#11	21	5060	0.5	2010	1360	6280	0.5	2530	1620	0	0.5	0	0	0	0.5	0	0
4x-6y	25	4890	0.7	1200	817	6000	0.7	1520	972	0	0.7	0	0	0	0.7	0	0
	40	4040	0.9	401	272	4720	0.9	505	324	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1910	1400	8.40	7.20	1910	1400	8.40	7.20	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = $Pex(KxLx)^2/10000$. (kip-ft²), Cey = $Pey(KyLy)^2/10000$. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 24 x 28

Designation		W 14 x370								W 14 x342							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.47 %	0	4300	0.0	2410	1460	5600	0.0	3200	1850	4070	0.0	2240	1380	5270	0.0	2960	1740
Ar(in²)	11	4220	0.2	2170	1320	5450	0.2	2880	1670	3990	0.2	2010	1240	5130	0.2	2670	1560
= 3.16	13	4180	0.3	1900	1150	5400	0.3	2520	1460	3960	0.3	1760	1090	5080	0.3	2330	1370
	17	4100	0.4	1630	986	5250	0.4	2160	1250	3870	0.4	1510	930	4940	0.4	2000	1170
4-# 8	21	3990	0.5	1360	822	5080	0.5	1800	1040	3770	0.5	1260	775	4780	0.5	1670	977
2x-2y	25	3870	0.7	814	493	4880	0.7	1080	625	3660	0.7	754	465	4590	0.7	999	586
	40	3280	0.9	271	164	3930	0.9	360	208	3090	0.9	251	155	3690	0.9	333	195
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1690	1240	8.40	7.20	1690	1240	8.40	7.20	1580	1160	8.40	7.20	1580	1160	8.40	7.20
.93 %	0	4410	0.0	2560	1580	5710	0.0	3350	1980	4180	0.0	2390	1500	5380	0.0	3110	1860
Ar(in²)	11	4320	0.2	2310	1420	5550	0.2	3020	1780	4090	0.2	2150	1350	5230	0.2	2800	1670
= 6.24	13	4280	0.3	2020	1250	5490	0.3	2640	1560	4050	0.3	1880	1180	5180	0.3	2450	1460
	17	4190	0.4	1730	1070	5350	0.4	2260	1330	3970	0.4	1610	1010	5040	0.4	2100	1250
4-#11	21	4080	0.5	1440	890	5170	0.5	1890	1110	3860	0.5	1340	843	4860	0.5	1750	1050
2x-2y	25	3950	0.7	864	534	4950	0.7	1130	666	3740	0.7	805	506	4670	0.7	1050	627
	40	3330	0.9	288	178	3970	0.9	377	222	3150	0.9	268	168	3740	0.9	350	209
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1690	1240	8.40	7.20	1690	1240	8.40	7.20	1580	1160	8.40	7.20	1580	1160	8.40	7.20
1.86 %	0	4620	0.0	2870	1740	5920	0.0	3670	2130	4390	0.0	2700	1660	5590	0.0	3420	2020
Ar(in²)	11	4520	0.2	2590	1570	5750	0.2	3300	1920	4290	0.2	2430	1490	5430	0.2	3080	1820
=12.48	13	4480	0.3	2260	1370	5690	0.3	2890	1680	4250	0.3	2130	1310	5370	0.3	2700	1590
	17	4380	0.4	1940	1180	5530	0.4	2480	1440	4160	0.4	1820	1120	5220	0.4	2310	1360
8-#11	21	4260	0.5	1620	979	5340	0.5	2060	1200	4040	0.5	1520	933	5040	0.5	1930	1130
4x-2y	25	4120	0.7	970	587	5110	0.7	1240	720	3910	0.7	910	559	4820	0.7	1160	680
	40	3450	0.9	323	195	4070	0.9	412	240	3260	0.9	303	186	3830	0.9	385	226
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1690	1240	8.40	7.20	1690	1240	8.40	7.20	1580	1160	8.40	7.20	1580	1160	8.40	7.20
2.68 %	0	4810	0.0	3140	1890	6110	0.0	3930	2280	4580	0.0	2960	1800	5780	0.0	3690	2160
Ar(in²)	11	4700	0.2	2830	1700	5930	0.2	3540	2050	4470	0.2	2670	1620	5610	0.2	3320	1950
=18.00	13	4660	0.3	2470	1490	5860	0.3	3100	1790	4430	0.3	2330	1420	5550	0.3	2910	1700
	17	4550	0.4	2120	1270	5700	0.4	2650	1540	4330	0.4	2000	1220	5390	0.4	2490	1460
8-#14	21	4420	0.5	1770	1060	5490	0.5	2210	1280	4200	0.5	1670	1010	5190	0.5	2080	1220
4x-2y	25	4270	0.7	1060	636	5250	0.7	1330	768	4060	0.7	1000	608	4960	0.7	1250	729
	40	3540	0.9	353	212	4140	0.9	442	256	3350	0.9	333	202	3900	0.9	415	243
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1690	1240	8.40	7.20	1690	1240	8.40	7.20	1580	1160	8.40	7.20	1580	1160	8.40	7.20
4.02 %	0	5120	0.0	3420	2250	6420	0.0	4210	2640	4890	0.0	3240	2170	6090	0.0	3970	2520
Ar(in²)	11	4990	0.2	3080	2020	6220	0.2	3790	2380	4770	0.2	2920	1950	5900	0.2	3570	2270
=27.00	13	4950	0.3	2690	1770	6150	0.3	3310	2080	4720	0.3	2550	1710	5830	0.3	3120	1990
	17	4830	0.4	2310	1520	5960	0.4	2840	1780	4600	0.4	2190	1460	5650	0.4	2680	1700
12-#14	21	4680	0.5	1920	1270	5730	0.5	2370	1490	4460	0.5	1820	1220	5430	0.5	2230	1420
4x-4y	25	4510	0.7	1150	759	5470	0.7	1420	891	4290	0.7	1090	731	5180	0.7	1340	852
	40	3700	0.9	384	253	4270	0.9	473	297	3500	0.9	364	243	4020	0.9	446	284
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1690	1240	8.40	7.20	1690	1240	8.40	7.20	1580	1160	8.40	7.20	1580	1160	8.40	7.20

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 28

Designation		W 14 x311								W 14 x283							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.47 %	0	3790	0.0	2050	1290	4880	0.0	2700	1610	3560	0.0	1880	1210	4550	0.0	2470	1500
Ar(in²)	11	3710	0.2	1840	1160	4750	0.2	2430	1450	3480	0.2	1690	1090	4430	0.2	2220	1350
= 3.16	13	3680	0.3	1610	1010	4700	0.3	2130	1270	3450	0.3	1480	952	4380	0.3	1950	1180
	17	3610	0.4	1380	869	4570	0.4	1820	1090	3380	0.4	1270	816	4260	0.4	1670	1010
4-# 8	21	3510	0.5	1150	724	4420	0.5	1520	906	3290	0.5	1060	680	4110	0.5	1390	844
2x-2y	25	3400	0.7	690	434	4240	0.7	911	544	3180	0.7	633	408	3950	0.7	833	506
	40	2870	0.9	230	144	3400	0.9	303	181	2680	0.9	211	136	3160	0.9	277	168
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1450	1070	8.40	7.20	1450	1070	8.40	7.20	1340	984	8.40	7.20	1340	984	8.40	7.20
.93 %	0	3900	0.0	2200	1410	4990	0.0	2850	1730	3660	0.0	2030	1330	4650	0.0	2620	1620
Ar(in²)	11	3810	0.2	1980	1270	4850	0.2	2570	1560	3580	0.2	1820	1200	4520	0.2	2360	1460
= 6.24	13	3780	0.3	1730	1110	4800	0.3	2250	1370	3550	0.3	1600	1050	4470	0.3	2060	1280
	17	3700	0.4	1480	951	4660	0.4	1920	1170	3470	0.4	1370	898	4350	0.4	1770	1100
4-#11	21	3600	0.5	1240	793	4500	0.5	1600	975	3380	0.5	1140	748	4200	0.5	1470	912
2x-2y	25	3480	0.7	741	475	4320	0.7	962	585	3270	0.7	684	449	4020	0.7	884	547
	40	2920	0.9	247	158	3450	0.9	320	195	2730	0.9	228	149	3210	0.9	294	182
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1450	1070	8.40	7.20	1450	1070	8.40	7.20	1340	983	8.40	7.20	1340	983	8.40	7.20
1.86 %	0	4110	0.0	2510	1570	5200	0.0	3160	1890	3880	0.0	2340	1490	4870	0.0	2930	1780
Ar(in²)	11	4020	0.2	2260	1410	5050	0.2	2850	1700	3790	0.2	2110	1340	4730	0.2	2640	1600
=12.48	13	3980	0.3	1980	1240	4990	0.3	2490	1490	3750	0.3	1840	1170	4670	0.3	2310	1400
	17	3890	0.4	1690	1060	4850	0.4	2140	1280	3660	0.4	1580	1010	4540	0.4	1980	1200
8-#11	21	3780	0.5	1410	882	4680	0.5	1780	1060	3560	0.5	1320	838	4370	0.5	1650	1000
4x-2y	25	3650	0.7	846	529	4470	0.7	1070	638	3430	0.7	790	502	4180	0.7	989	601
	40	3030	0.9	282	176	3540	0.9	355	212	2840	0.9	263	167	3290	0.9	329	200
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1450	1060	8.40	7.20	1450	1060	8.40	7.20	1340	982	8.40	7.20	1340	982	8.40	7.20
2.68 %	0	4300	0.0	2770	1710	5390	0.0	3430	2040	4060	0.0	2610	1630	5060	0.0	3200	1930
Ar(in²)	11	4200	0.2	2500	1540	5230	0.2	3090	1830	3970	0.2	2350	1470	4900	0.2	2880	1730
=18.00	13	4160	0.3	2190	1350	5170	0.3	2700	1600	3930	0.3	2050	1290	4840	0.3	2520	1520
	17	4060	0.4	1870	1160	5010	0.4	2310	1370	3830	0.4	1760	1100	4700	0.4	2160	1300
8-#14	21	3940	0.5	1560	963	4830	0.5	1930	1150	3710	0.5	1470	919	4520	0.5	1800	1080
4x-2y	25	3800	0.7	936	578	4610	0.7	1160	687	3580	0.7	879	551	4310	0.7	1080	649
	40	3130	0.9	312	192	3610	0.9	385	229	2930	0.9	293	183	3370	0.9	359	216
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1450	1060	8.40	7.20	1450	1060	8.40	7.20	1340	980	8.40	7.20	1340	980	8.40	7.20
4.02 %	0	4610	0.0	3050	2080	5700	0.0	3710	2400	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	4490	0.2	2750	1870	5520	0.2	3340	2160	0	0.2	0	0	0	0.2	0	0
=27.00	13	4440	0.3	2400	1640	5450	0.3	2920	1890	0	0.3	0	0	0	0.3	0	0
	17	4330	0.4	2060	1400	5280	0.4	2500	1620	0	0.4	0	0	0	0.4	0	0
12-#14	21	4190	0.5	1720	1170	5070	0.5	2080	1350	0	0.5	0	0	0	0.5	0	0
4x-4y	25	4030	0.7	1030	700	4830	0.7	1250	809	0	0.7	0	0	0	0.7	0	0
	40	3270	0.9	343	233	3730	0.9	416	269	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1440	1060	8.40	7.20	1440	1060	8.40	7.20	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) — Column Size(b x h): 24 x 28

Designation		W 14 x257								W 14 x233							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.47 %	0	3330	0.0	1720	1140	4230	0.0	2260	1400	3130	0.0	1580	1070	3940	0.0	2060	1310
Ar(in²)	11	3260	0.2	1550	1020	4120	0.2	2030	1260	3060	0.2	1420	961	3830	0.2	1850	1180
= 3.16	13	3230	0.3	1360	894	4070	0.3	1780	1100	3030	0.3	1240	841	3790	0.3	1620	1030
	17	3160	0.4	1160	766	3960	0.4	1520	944	2970	0.4	1060	721	3690	0.4	1390	881
4-# 8	21	3080	0.5	968	639	3830	0.5	1270	787	2880	0.5	887	601	3560	0.5	1160	734
2x-2y	25	2980	0.7	580	383	3670	0.7	761	472	2790	0.7	532	360	3410	0.7	695	440
	40	2500	0.9	193	127	2930	0.9	253	157	2330	0.9	177	120	2720	0.9	231	146
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1230	906	8.40	7.20	1230	906	8.40	7.20	1140	834	8.40	7.20	1140	834	8.40	7.20
.93 %	0	3440	0.0	1870	1260	4340	0.0	2410	1520	3230	0.0	1730	1190	4050	0.0	2210	1430
Ar(in²)	11	3360	0.2	1680	1130	4220	0.2	2170	1370	3160	0.2	1550	1070	3930	0.2	1990	1280
= 6.24	13	3330	0.3	1470	990	4170	0.3	1900	1200	3130	0.3	1360	937	3890	0.3	1740	1120
	17	3260	0.4	1260	849	4050	0.4	1620	1030	3060	0.4	1170	803	3780	0.4	1490	963
4-#11	21	3170	0.5	1050	707	3910	0.5	1350	855	2970	0.5	971	669	3640	0.5	1240	803
2x-2y	25	3060	0.7	631	424	3740	0.7	812	513	2870	0.7	583	401	3490	0.7	746	481
	40	2550	0.9	210	141	2970	0.9	270	171	2380	0.9	194	133	2760	0.9	248	160
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1230	905	8.40	7.20	1230	905	8.40	7.20	1140	834	8.40	7.20	1140	834	8.40	7.20
1.86 %	0	3650	0.0	2180	1420	4550	0.0	2720	1680	3450	0.0	2040	1350	4260	0.0	2520	1590
Ar(in²)	11	3570	0.2	1970	1280	4420	0.2	2450	1510	3360	0.2	1840	1210	4130	0.2	2270	1430
=12.48	13	3530	0.3	1720	1120	4370	0.3	2140	1320	3330	0.3	1610	1060	4080	0.3	1990	1250
	17	3450	0.4	1470	956	4240	0.4	1840	1130	3250	0.4	1380	911	3960	0.4	1700	1070
8-#11	21	3350	0.5	1230	796	4080	0.5	1530	944	3150	0.5	1150	759	3810	0.5	1420	892
4x-2y	25	3230	0.7	737	478	3900	0.7	917	566	3030	0.7	688	455	3640	0.7	851	535
	40	2660	0.9	245	159	3060	0.9	305	188	2490	0.9	229	151	2850	0.9	283	178
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1230	904	8.40	7.20	1230	904	8.40	7.20	1130	832	8.40	7.20	1130	832	8.40	7.20
2.68 %	0	3840	0.0	2450	1560	4740	0.0	2990	1820	3630	0.0	2310	1490	4450	0.0	2790	1730
Ar(in²)	11	3740	0.2	2210	1410	4590	0.2	2690	1640	3540	0.2	2080	1340	4310	0.2	2510	1560
=18.00	13	3710	0.3	1930	1230	4540	0.3	2350	1440	3500	0.3	1820	1180	4260	0.3	2200	1360
	17	3620	0.4	1650	1050	4400	0.4	2020	1230	3420	0.4	1560	1010	4120	0.4	1880	1170
8-#14	21	3500	0.5	1380	878	4230	0.5	1680	1030	3310	0.5	1300	840	3960	0.5	1570	973
4x-2y	25	3370	0.7	827	526	4030	0.7	1010	615	3180	0.7	778	504	3770	0.7	941	584
	40	2750	0.9	275	175	3140	0.9	335	205	2580	0.9	259	168	2920	0.9	313	194
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1230	903	8.40	7.20	1230	903	8.40	7.20	1130	831	8.40	7.20	1130	831	8.40	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = $\phi bMnx$ and Muy = $\phi bMny$ when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 28

Designation		W 14 x211								W 14 x193							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.47 %	0	2940	0.0	1450	1010	3680	0.0	1880	1220	2790	0.0	1340	956	3460	0.0	1740	1160
Ar(in²)	11	2870	0.2	1300	905	3570	0.2	1690	1100	2720	0.2	1210	860	3360	0.2	1570	1040
= 3.16	13	2850	0.3	1140	792	3530	0.3	1480	961	2700	0.3	1060	752	3330	0.3	1370	910
	17	2780	0.4	976	679	3430	0.4	1270	824	2640	0.4	907	645	3230	0.4	1180	780
4-# 8	21	2700	0.5	813	565	3310	0.5	1060	686	2560	0.5	756	537	3120	0.5	981	650
2x-2y	25	2610	0.7	488	339	3170	0.7	635	412	2470	0.7	453	322	2980	0.7	588	390
	40	2170	0.9	162	113	2520	0.9	211	137	2050	0.9	151	107	2370	0.9	196	130
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1050	769	8.40	7.20	1050	769	8.40	7.20	975	716	8.40	7.20	975	716	8.40	7.20
.93 %	0	3040	0.0	1600	1130	3780	0.0	2030	1340	2890	0.0	1490	1080	3570	0.0	1890	1280
Ar(in²)	11	2970	0.2	1440	1010	3670	0.2	1830	1210	2820	0.2	1350	970	3460	0.2	1710	1150
= 6.24	13	2950	0.3	1260	888	3630	0.3	1600	1060	2800	0.3	1180	849	3420	0.3	1490	1010
	17	2880	0.4	1080	761	3530	0.4	1370	906	2730	0.4	1010	727	3320	0.4	1280	862
4-#11	21	2790	0.5	898	634	3400	0.5	1140	755	2650	0.5	840	606	3200	0.5	1070	718
2x-2y	25	2690	0.7	539	380	3250	0.7	686	453	2550	0.7	504	363	3060	0.7	639	431
	40	2230	0.9	179	126	2570	0.9	228	151	2100	0.9	168	121	2410	0.9	213	143
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1050	768	8.40	7.20	1050	768	8.40	7.20	974	716	8.40	7.20	974	716	8.40	7.20
1.86 %	0	3260	0.0	1910	1290	3990	0.0	2350	1500	3110	0.0	1810	1240	3780	0.0	2210	1440
Ar(in²)	11	3180	0.2	1720	1160	3870	0.2	2110	1350	3030	0.2	1630	1110	3660	0.2	1990	1290
=12.48	13	3140	0.3	1500	1010	3830	0.3	1850	1180	3000	0.3	1420	974	3620	0.3	1740	1130
	17	3070	0.4	1290	868	3710	0.4	1580	1010	2920	0.4	1220	835	3510	0.4	1490	970
8-#11	21	2970	0.5	1070	723	3570	0.5	1320	844	2830	0.5	1020	696	3370	0.5	1240	808
4x-2y	25	2860	0.7	644	434	3400	0.7	791	506	2720	0.7	610	417	3210	0.7	745	485
	40	2330	0.9	214	144	2650	0.9	263	168	2210	0.9	203	139	2490	0.9	248	161
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1040	767	8.40	7.20	1040	767	8.40	7.20	972	714	8.40	7.20	972	714	8.40	7.20
3.02 %	0	3520	0.0	2100	1620	4260	0.0	2520	1840	3370	0.0	2000	1570	4050	0.0	2380	1770
Ar(in²)	11	3430	0.2	1890	1460	4120	0.2	2270	1650	3280	0.2	1800	1420	3910	0.2	2150	1600
=20.32	13	3390	0.3	1650	1280	4070	0.3	1980	1450	3240	0.3	1570	1240	3860	0.3	1880	1400
	17	3300	0.4	1410	1100	3940	0.4	1700	1240	3150	0.4	1350	1060	3740	0.4	1610	1200
16-#10	21	3190	0.5	1180	913	3780	0.5	1420	1030	3040	0.5	1120	885	3580	0.5	1340	997
4x-6y	25	3060	0.7	707	547	3590	0.7	850	620	2920	0.7	674	531	3400	0.7	804	598
	40	2450	0.9	235	182	2750	0.9	283	206	2320	0.9	224	177	2590	0.9	268	199
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1040	765	8.40	7.20	1040	765	8.40	7.20	970	713	8.40	7.20	970	713	8.40	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 28

Designation		W 14 x176								W 14 x159							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.47 %	0	2640	0.0	1240	906	3260	0.0	1610	1090	2490	0.0	1150	855	3050	0.0	1480	1030
Ar(in²)	11	2580	0.2	1120	815	3160	0.2	1450	982	2430	0.2	1030	770	2960	0.2	1330	924
= 3.16	13	2560	0.3	979	713	3130	0.3	1270	859	2410	0.3	902	674	2930	0.3	1160	808
	17	2500	0.4	839	611	3040	0.4	1090	736	2350	0.4	773	577	2840	0.4	995	693
4-# 8	21	2420	0.5	699	509	2930	0.5	904	613	2280	0.5	644	481	2740	0.5	829	577
2x-2y	25	2340	0.7	419	305	2800	0.7	542	368	2200	0.7	386	288	2620	0.7	497	346
	40	1930	0.9	139	101	2220	0.9	180	122	1810	0.9	128	96	2060	0.9	165	115
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		906	666	8.40	7.20	906	666	8.40	7.20	836	614	8.40	7.20	836	614	8.40	7.20
.93 %	0	2750	0.0	1390	1030	3360	0.0	1760	1210	2600	0.0	1300	978	3150	0.0	1630	1150
Ar(in²)	11	2680	0.2	1260	925	3260	0.2	1580	1090	2530	0.2	1170	880	3060	0.2	1460	1030
= 6.24	13	2650	0.3	1100	809	3230	0.3	1380	955	2510	0.3	1020	770	3020	0.3	1280	904
	17	2590	0.4	941	693	3130	0.4	1190	818	2450	0.4	874	660	2930	0.4	1100	775
4-#11	21	2510	0.5	784	578	3010	0.5	989	682	2370	0.5	729	550	2820	0.5	914	646
2x-2y	25	2420	0.7	470	346	2880	0.7	593	409	2280	0.7	437	330	2690	0.7	548	387
	40	1980	0.9	156	115	2260	0.9	197	136	1860	0.9	145	110	2100	0.9	182	129
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		906	665	8.40	7.20	906	665	8.40	7.20	836	614	8.40	7.20	836	614	8.40	7.20
1.86 %	0	2960	0.0	1710	1190	3580	0.0	2070	1370	2810	0.0	1610	1140	3370	0.0	1940	1310
Ar(in²)	11	2880	0.2	1540	1070	3460	0.2	1860	1230	2740	0.2	1450	1020	3260	0.2	1750	1180
=12.48	13	2850	0.3	1350	935	3420	0.3	1630	1080	2710	0.3	1270	895	3220	0.3	1530	1030
	17	2780	0.4	1150	801	3310	0.4	1400	926	2630	0.4	1090	767	3110	0.4	1310	882
8-#11	21	2690	0.5	961	667	3180	0.5	1170	771	2550	0.5	905	639	2990	0.5	1090	735
4x-2y	25	2580	0.7	576	400	3030	0.7	699	463	2440	0.7	543	383	2840	0.7	654	441
	40	2080	0.9	192	133	2340	0.9	233	154	1960	0.9	181	127	2180	0.9	218	147
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		904	664	8.40	7.20	904	664	8.40	7.20	834	612	8.40	7.20	834	612	8.40	7.20
3.02 %	0	3230	0.0	1900	1520	3840	0.0	2250	1710	3080	0.0	1810	1470	3640	0.0	2120	1640
Ar(in²)	11	3140	0.2	1710	1370	3710	0.2	2030	1540	2990	0.2	1630	1330	3510	0.2	1910	1480
=20.32	13	3100	0.3	1500	1200	3660	0.3	1770	1350	2950	0.3	1430	1160	3460	0.3	1670	1290
	17	3010	0.4	1290	1030	3540	0.4	1520	1150	2870	0.4	1220	995	3340	0.4	1430	1110
16-#10	21	2900	0.5	1070	857	3390	0.5	1270	960	2760	0.5	1020	829	3200	0.5	1190	924
4x-6y	25	2780	0.7	642	514	3220	0.7	759	576	2640	0.7	611	497	3030	0.7	716	554
	40	2200	0.9	214	171	2430	0.9	253	192	2070	0.9	203	165	2280	0.9	238	184
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		901	662	8.40	7.20	901	662	8.40	7.20	831	611	8.40	7.20	831	611	8.40	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 28

Designation		W 14 x145								W 14 x132							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.47 %	0	2380	0.0	1070	814	2890	0.0	1370	973	2260	0.0	992	758	2730	0.0	1260	899
Ar(in²)	11	2320	0.2	959	732	2800	0.2	1230	876	2210	0.2	893	682	2640	0.2	1140	809
= 3.16	13	2300	0.3	839	641	2770	0.3	1080	766	2190	0.3	781	597	2610	0.3	995	708
	17	2240	0.4	719	549	2690	0.4	922	657	2130	0.4	669	512	2540	0.4	853	607
4-# 8	21	2170	0.5	599	457	2590	0.5	768	547	2070	0.5	558	426	2440	0.5	711	506
2x-2y	25	2090	0.7	359	274	2470	0.7	461	328	1990	0.7	334	256	2330	0.7	426	303
	40	1720	0.9	119	91	1940	0.9	153	109	1620	0.9	111	85	1820	0.9	142	101
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		782	574	8.40	7.20	782	574	8.40	7.20	728	535	8.40	7.20	728	535	8.40	7.20
.93 %	0	2480	0.0	1220	936	2990	0.0	1520	1100	2370	0.0	1140	881	2830	0.0	1410	1020
Ar(in²)	11	2420	0.2	1100	842	2900	0.2	1370	985	2310	0.2	1030	793	2740	0.2	1270	919
= 6.24	13	2390	0.3	958	737	2860	0.3	1190	862	2280	0.3	900	693	2710	0.3	1110	804
	17	2330	0.4	821	631	2780	0.4	1020	739	2220	0.4	771	594	2630	0.4	955	689
4-#11	21	2260	0.5	684	526	2670	0.5	853	616	2150	0.5	642	495	2520	0.5	795	574
2x-2y	25	2170	0.7	410	315	2550	0.7	512	369	2070	0.7	385	297	2410	0.7	477	344
	40	1770	0.9	136	105	1980	0.9	170	123	1670	0.9	128	99	1870	0.9	159	114
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		781	573	8.40	7.20	781	573	8.40	7.20	727	534	8.40	7.20	727	534	8.40	7.20
1.86 %	0	2700	0.0	1530	1100	3200	0.0	1830	1250	2580	0.0	1460	1040	3040	0.0	1730	1180
Ar(in²)	11	2620	0.2	1380	986	3100	0.2	1650	1130	2510	0.2	1310	936	2940	0.2	1560	1060
=12.48	13	2590	0.3	1210	863	3060	0.3	1440	988	2480	0.3	1150	819	2900	0.3	1360	929
	17	2520	0.4	1030	739	2960	0.4	1240	846	2410	0.4	983	702	2810	0.4	1170	797
8-#11	21	2430	0.5	861	616	2840	0.5	1030	705	2320	0.5	819	585	2690	0.5	972	664
4x-2y	25	2330	0.7	516	369	2700	0.7	618	423	2220	0.7	491	351	2550	0.7	583	398
	40	1860	0.9	172	123	2060	0.9	206	141	1760	0.9	163	117	1940	0.9	194	132
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		779	572	8.40	7.20	779	572	8.40	7.20	725	533	8.40	7.20	725	533	8.40	7.20
3.02 %	0	2960	0.0	1740	1430	3470	0.0	2020	1590	2850	0.0	1670	1380	3310	0.0	1920	1520
Ar(in²)	11	2870	0.2	1570	1290	3350	0.2	1820	1430	2760	0.2	1500	1240	3190	0.2	1730	1370
=20.32	13	2840	0.3	1370	1130	3300	0.3	1590	1250	2730	0.3	1310	1090	3140	0.3	1510	1200
	17	2750	0.4	1170	967	3180	0.4	1360	1070	2640	0.4	1130	930	3030	0.4	1300	1020
16-#10	21	2650	0.5	978	806	3040	0.5	1140	895	2540	0.5	938	775	2890	0.5	1080	853
4x-6y	25	2530	0.7	587	483	2880	0.7	682	537	2420	0.7	563	465	2730	0.7	649	512
	40	1970	0.9	195	161	2150	0.9	227	179	1870	0.9	187	155	2030	0.9	216	170
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		776	570	8.40	7.20	776	570	8.40	7.20	723	531	8.40	7.20	723	531	8.40	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 24 x 28

Designation		W 14 x120								W 14 x109							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.47 %	0	2160	0.0	926	723	2580	0.0	1170	855	2070	0.0	864	688	2450	0.0	1090	812
Ar(in²)	11	2110	0.2	833	650	2500	0.2	1060	769	2010	0.2	777	619	2370	0.2	978	731
= 3.16	13	2090	0.3	729	569	2470	0.3	923	673	1990	0.3	680	542	2340	0.3	855	639
	17	2030	0.4	625	488	2400	0.4	791	577	1940	0.4	583	464	2270	0.4	733	548
4-# 8	21	1970	0.5	521	406	2310	0.5	659	481	1880	0.5	486	387	2180	0.5	611	457
2x-2y	25	1890	0.7	312	244	2200	0.7	395	288	1800	0.7	291	232	2080	0.7	366	274
	40	1540	0.9	104	81	1720	0.9	131	96	1460	0.9	97	77	1620	0.9	122	91
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		680	499	8.40	7.20	680	499	8.40	7.20	635	466	8.40	7.20	635	466	8.40	7.20
.93 %	0	2270	0.0	1080	845	2690	0.0	1320	977	2170	0.0	1010	810	2550	0.0	1240	934
Ar(in²)	11	2210	0.2	969	760	2600	0.2	1190	879	2110	0.2	913	729	2470	0.2	1110	841
= 6.24	13	2180	0.3	847	665	2570	0.3	1040	769	2090	0.3	799	638	2440	0.3	974	736
	17	2130	0.4	726	570	2490	0.4	892	659	2030	0.4	684	547	2360	0.4	835	630
4-#11	21	2050	0.5	605	475	2390	0.5	744	549	1960	0.5	570	456	2270	0.5	695	525
2x-2y	25	1970	0.7	363	285	2280	0.7	446	329	1880	0.7	342	273	2160	0.7	417	315
	40	1590	0.9	121	95	1760	0.9	148	109	1500	0.9	114	91	1660	0.9	139	105
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		679	499	8.40	7.20	679	499	8.40	7.20	634	465	8.40	7.20	634	465	8.40	7.20
1.86 %	0	2480	0.0	1390	1010	2900	0.0	1640	1140	2380	0.0	1330	971	2770	0.0	1550	1090
Ar(in²)	11	2410	0.2	1250	905	2800	0.2	1470	1020	2310	0.2	1200	874	2670	0.2	1400	984
=12.48	13	2380	0.3	1100	791	2760	0.3	1290	895	2290	0.3	1050	764	2630	0.3	1220	861
	17	2310	0.4	938	678	2670	0.4	1110	767	2220	0.4	897	655	2540	0.4	1050	738
8-#11	21	2230	0.5	782	565	2560	0.5	920	639	2130	0.5	747	546	2430	0.5	872	615
4x-2y	25	2130	0.7	469	339	2420	0.7	552	383	2040	0.7	448	327	2300	0.7	523	369
	40	1680	0.9	156	113	1830	0.9	184	127	1590	0.9	149	109	1730	0.9	174	123
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		677	497	8.40	7.20	677	497	8.40	7.20	632	464	8.40	7.20	632	464	8.40	7.20
3.02 %	0	2750	0.0	1610	1340	3170	0.0	1840	1470	2650	0.0	1550	1310	3030	0.0	1760	1430
Ar(in²)	11	2660	0.2	1450	1210	3050	0.2	1650	1330	2560	0.2	1390	1180	2920	0.2	1580	1290
=20.32	13	2620	0.3	1270	1060	3000	0.3	1450	1160	2530	0.3	1220	1030	2870	0.3	1390	1130
	17	2540	0.4	1090	906	2890	0.4	1240	994	2440	0.4	1050	883	2760	0.4	1190	966
16-#10	21	2440	0.5	904	755	2760	0.5	1030	828	2340	0.5	871	736	2630	0.5	989	805
4x-6y	25	2320	0.7	542	453	2600	0.7	620	497	2220	0.7	523	441	2480	0.7	593	483
	40	1780	0.9	180	151	1920	0.9	206	165	1690	0.9	174	147	1810	0.9	197	161
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		675	496	8.40	7.20	675	496	8.40	7.20	630	462	8.40	7.20	630	462	8.40	7.20
3.71 %	0	2910	0.0	1760	1520	3330	0.0	2000	1650	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	2810	0.2	1590	1370	3200	0.2	1800	1480	0	0.2	0	0	0	0.2	0	0
=24.96	13	2770	0.3	1390	1200	3150	0.3	1570	1300	0	0.3	0	0	0	0.3	0	0
	17	2670	0.4	1190	1030	3020	0.4	1350	1110	0	0.4	0	0	0	0.4	0	0
16-#11	21	2560	0.5	992	854	2880	0.5	1120	927	0	0.5	0	0	0	0.5	0	0
4x-6y	25	2430	0.7	595	512	2710	0.7	673	556	0	0.7	0	0	0	0.7	0	0
	40	1830	0.9	198	170	1960	0.9	224	185	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		674	495	8.40	7.20	674	495	8.40	7.20	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 24 x 28

Designation		W 14 x 99								W							
Fy (ksi)		36				50											
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy								
.47 %	0	1980	0.0	809	655	2330	0.0	1010	772								
Ar(in²)	11	1930	0.2	728	590	2260	0.2	909	695								
= 3.16	13	1910	0.3	637	516	2230	0.3	795	608								
	17	1860	0.4	546	442	2160	0.4	682	521								
4-# 8	21	1800	0.5	455	368	2070	0.5	568	434								
2x-2y	25	1720	0.7	273	221	1980	0.7	341	260								
	40	1390	0.9	91	73	1530	0.9	113	86								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		595	437	8.40	7.20	595	437	8.40	7.20								
.93 %	0	2090	0.0	959	778	2430	0.0	1160	894								
Ar(in²)	11	2030	0.2	863	700	2350	0.2	1050	805								
= 6.24	13	2010	0.3	755	612	2320	0.3	914	704								
	17	1950	0.4	647	525	2250	0.4	783	604								
4-#11	21	1880	0.5	539	437	2160	0.5	653	503								
2x-2y	25	1800	0.7	323	262	2050	0.7	391	302								
	40	1430	0.9	107	87	1570	0.9	130	100								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		594	436	8.40	7.20	594	436	8.40	7.20								
1.86 %	0	2300	0.0	1270	938	2650	0.0	1480	1050								
Ar(in²)	11	2230	0.2	1150	845	2550	0.2	1330	949								
=12.48	13	2200	0.3	1000	739	2520	0.3	1160	830								
	17	2130	0.4	860	633	2430	0.4	995	712								
8-#11	21	2050	0.5	716	528	2320	0.5	829	593								
4x-2y	25	1960	0.7	430	316	2200	0.7	497	356								
	40	1520	0.9	143	105	1640	0.9	165	118								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		592	435	8.40	7.20	592	435	8.40	7.20								
3.02 %	0	2570	0.0	1500	1280	2910	0.0	1690	1390								
Ar(in²)	11	2480	0.2	1350	1150	2800	0.2	1520	1250								
=20.32	13	2440	0.3	1180	1010	2760	0.3	1330	1100								
	17	2360	0.4	1010	862	2650	0.4	1140	939								
16-#10	21	2260	0.5	842	718	2520	0.5	949	783								
4x-6y	25	2140	0.7	505	431	2370	0.7	569	469								
	40	1610	0.9	168	143	1720	0.9	189	156								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		590	433	8.40	7.20	590	433	8.40	7.20								
4.02 %	0	2800	0.0	1820	1450	3140	0.0	2020	1560								
Ar(in²)	11	2690	0.2	1640	1310	3010	0.2	1820	1410								
=27.00	13	2650	0.3	1430	1140	2960	0.3	1590	1230								
	17	2550	0.4	1230	978	2830	0.4	1370	1060								
12-#14	21	2430	0.5	1020	815	2680	0.5	1140	880								
4x-4y	25	2290	0.7	614	489	2510	0.7	682	528								
	40	1680	0.9	204	163	1770	0.9	227	176								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		588	432	8.40	7.20	588	432	8.40	7.20								

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW

$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 28

Designation		W 12 x336								W 12 x305							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.47 %	0	4010	0.0	2070	1210	5180	0.0	2720	1500	3740	0.0	1890	1130	4810	0.0	2470	1390
Ar(in²)	11	3930	0.2	1860	1090	5050	0.2	2450	1350	3660	0.2	1700	1020	4680	0.2	2220	1250
= 3.16	13	3890	0.3	1630	952	4990	0.3	2140	1180	3630	0.3	1490	891	4630	0.3	1950	1100
	17	3810	0.4	1390	816	4860	0.4	1840	1010	3560	0.4	1270	764	4500	0.4	1670	940
4-# 8	21	3710	0.5	1160	680	4700	0.5	1530	844	3460	0.5	1060	636	4350	0.5	1390	783
2x-2y	25	3600	0.7	697	408	4510	0.7	917	506	3350	0.7	636	382	4170	0.7	834	470
	40	3040	0.9	232	136	3620	0.9	305	168	2820	0.9	212	127	3350	0.9	278	156
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1550	1140	8.40	7.20	1550	1140	8.40	7.20	1430	1050	8.40	7.20	1430	1050	8.40	7.20
.93 %	0	4110	0.0	2220	1330	5290	0.0	2870	1620	3850	0.0	2040	1250	4910	0.0	2620	1510
Ar(in²)	11	4030	0.2	1990	1200	5140	0.2	2580	1460	3760	0.2	1830	1130	4780	0.2	2360	1360
= 6.24	13	3990	0.3	1750	1050	5090	0.3	2260	1280	3730	0.3	1600	987	4720	0.3	2060	1190
	17	3910	0.4	1500	898	4950	0.4	1940	1100	3650	0.4	1370	846	4600	0.4	1770	1020
4-#11	21	3800	0.5	1250	748	4780	0.5	1610	912	3550	0.5	1150	705	4440	0.5	1470	852
2x-2y	25	3680	0.7	747	449	4590	0.7	968	547	3430	0.7	687	423	4250	0.7	884	511
	40	3100	0.9	249	149	3670	0.9	322	182	2880	0.9	229	141	3390	0.9	294	170
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1550	1140	8.40	7.20	1550	1140	8.40	7.20	1430	1050	8.40	7.20	1430	1050	8.40	7.20
1.86 %	0	4330	0.0	2530	1490	5500	0.0	3180	1780	4060	0.0	2350	1410	5130	0.0	2930	1670
Ar(in²)	11	4230	0.2	2280	1340	5350	0.2	2860	1600	3970	0.2	2110	1270	4980	0.2	2640	1510
=12.48	13	4190	0.3	1990	1170	5290	0.3	2510	1400	3930	0.3	1850	1110	4920	0.3	2310	1320
	17	4100	0.4	1710	1010	5140	0.4	2150	1200	3840	0.4	1590	953	4780	0.4	1980	1130
8-#11	21	3980	0.5	1420	838	4950	0.5	1790	1000	3730	0.5	1320	794	4610	0.5	1650	941
4x-2y	25	3850	0.7	853	502	4740	0.7	1070	601	3600	0.7	792	476	4410	0.7	990	564
	40	3210	0.9	284	167	3760	0.9	357	200	2990	0.9	264	158	3480	0.9	330	188
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1550	1140	8.40	7.20	1550	1140	8.40	7.20	1420	1050	8.40	7.20	1420	1050	8.40	7.20
3.02 %	0	4590	0.0	2700	1830	5770	0.0	3350	2120	4330	0.0	2520	1750	5390	0.0	3100	2010
Ar(in²)	11	4490	0.2	2430	1640	5600	0.2	3010	1910	4220	0.2	2270	1570	5230	0.2	2790	1810
=20.32	13	4440	0.3	2120	1440	5530	0.3	2640	1670	4180	0.3	1980	1380	5170	0.3	2440	1580
	17	4340	0.4	1820	1230	5370	0.4	2260	1430	4080	0.4	1700	1180	5010	0.4	2090	1360
16-#10	21	4210	0.5	1520	1030	5170	0.5	1880	1190	3950	0.5	1420	983	4820	0.5	1750	1130
4x-6y	25	4060	0.7	910	616	4940	0.7	1130	714	3810	0.7	849	590	4600	0.7	1050	678
	40	3340	0.9	303	205	3870	0.9	376	238	3120	0.9	283	196	3590	0.9	349	226
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1550	1140	8.40	7.20	1550	1140	8.40	7.20	1420	1040	8.40	7.20	1420	1040	8.40	7.20
4.02 %	0	4820	0.0	3070	2000	6000	0.0	3720	2290	4560	0.0	2890	1920	5620	0.0	3480	2180
Ar(in²)	11	4700	0.2	2760	1800	5810	0.2	3350	2060	4440	0.2	2600	1730	5440	0.2	3130	1960
=27.00	13	4660	0.3	2420	1570	5740	0.3	2930	1800	4390	0.3	2280	1510	5370	0.3	2740	1720
	17	4540	0.4	2070	1350	5560	0.4	2510	1540	4280	0.4	1950	1300	5210	0.4	2350	1470
12-#14	21	4400	0.5	1730	1120	5350	0.5	2090	1290	4140	0.5	1630	1080	5000	0.5	1960	1230
4x-4y	25	4230	0.7	1040	674	5100	0.7	1260	772	3980	0.7	976	648	4760	0.7	1170	736
	40	3450	0.9	345	224	3960	0.9	418	257	3230	0.9	325	216	3680	0.9	391	245
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1550	1140	8.40	7.20	1550	1140	8.40	7.20	1420	1040	8.40	7.20	1420	1040	8.40	7.20

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2: Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 28

Designation		W 12 x279								W 12 x252							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.47 %	0	3520	0.0	1730	1070	4490	0.0	2260	1300	3290	0.0	1580	1000	4170	0.0	2060	1210
Ar(in²)	11	3440	0.2	1560	960	4370	0.2	2030	1170	3220	0.2	1430	903	4060	0.2	1850	1090
= 3.16	13	3410	0.3	1360	840	4320	0.3	1780	1030	3190	0.3	1250	790	4010	0.3	1620	956
	17	3340	0.4	1170	720	4210	0.4	1530	879	3120	0.4	1070	677	3900	0.4	1390	819
4-# 8	21	3250	0.5	974	600	4060	0.5	1270	732	3040	0.5	890	564	3770	0.5	1160	682
2x-2y	25	3150	0.7	584	360	3900	0.7	762	439	2940	0.7	534	338	3610	0.7	694	409
	40	2640	0.9	194	120	3120	0.9	254	146	2460	0.9	178	112	2890	0.9	231	136
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1320	970	8.40	7.20	1320	970	8.40	7.20	1210	891	8.40	7.20	1210	891	8.40	7.20
.93 %	0	3620	0.0	1880	1190	4600	0.0	2410	1420	3400	0.0	1730	1130	4280	0.0	2210	1340
Ar(in²)	11	3540	0.2	1690	1070	4470	0.2	2170	1280	3320	0.2	1560	1010	4160	0.2	1990	1200
= 6.24	13	3510	0.3	1480	936	4420	0.3	1900	1120	3290	0.3	1370	886	4110	0.3	1740	1050
	17	3430	0.4	1270	802	4300	0.4	1630	961	3220	0.4	1170	759	3990	0.4	1490	901
4-#11	21	3340	0.5	1060	668	4150	0.5	1360	801	3130	0.5	975	633	3850	0.5	1240	751
2x-2y	25	3230	0.7	635	401	3970	0.7	813	480	3020	0.7	585	379	3690	0.7	744	450
	40	2700	0.9	211	133	3160	0.9	271	160	2510	0.9	195	126	2930	0.9	248	150
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1320	969	8.40	7.20	1320	969	8.40	7.20	1210	890	8.40	7.20	1210	890	8.40	7.20
1.86 %	0	3840	0.0	2200	1350	4810	0.0	2720	1580	3610	0.0	2050	1280	4490	0.0	2520	1490
Ar(in²)	11	3750	0.2	1980	1210	4670	0.2	2450	1420	3520	0.2	1840	1160	4360	0.2	2270	1350
=12.48	13	3710	0.3	1730	1060	4620	0.3	2140	1250	3490	0.3	1610	1010	4310	0.3	1980	1180
	17	3630	0.4	1480	909	4480	0.4	1840	1070	3410	0.4	1380	866	4180	0.4	1700	1010
8-#11	21	3520	0.5	1230	758	4320	0.5	1530	890	3300	0.5	1150	722	4020	0.5	1420	840
4x-2y	25	3400	0.7	740	454	4130	0.7	918	534	3190	0.7	690	433	3840	0.7	850	504
	40	2810	0.9	246	151	3250	0.9	306	178	2620	0.9	230	144	3020	0.9	283	168
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1320	968	8.40	7.20	1320	968	8.40	7.20	1210	889	8.40	7.20	1210	889	8.40	7.20
3.02 %	0	4100	0.0	2360	1680	5080	0.0	2890	1920	3880	0.0	2220	1620	4760	0.0	2690	1830
Ar(in²)	11	4000	0.2	2130	1520	4920	0.2	2600	1730	3780	0.2	2000	1460	4610	0.2	2420	1650
=20.32	13	3960	0.3	1860	1330	4860	0.3	2280	1510	3740	0.3	1750	1280	4550	0.3	2120	1440
	17	3860	0.4	1600	1140	4710	0.4	1950	1300	3640	0.4	1500	1090	4410	0.4	1810	1240
16-#10	21	3740	0.5	1330	947	4530	0.5	1630	1080	3530	0.5	1250	911	4240	0.5	1510	1030
4x-6y	25	3600	0.7	797	568	4320	0.7	975	647	3390	0.7	748	547	4030	0.7	907	617
	40	2940	0.9	265	189	3360	0.9	325	215	2750	0.9	249	182	3120	0.9	302	205
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1320	966	8.40	7.20	1320	966	8.40	7.20	1210	887	8.40	7.20	1210	887	8.40	7.20
4.02 %	0	4330	0.0	2740	1860	5310	0.0	3270	2090	4100	0.0	2590	1790	4990	0.0	3060	2000
Ar(in²)	11	4220	0.2	2470	1670	5140	0.2	2940	1880	3990	0.2	2330	1610	4820	0.2	2760	1800
=27.00	13	4170	0.3	2160	1460	5070	0.3	2570	1650	3950	0.3	2040	1410	4760	0.3	2410	1580
	17	4060	0.4	1850	1250	4910	0.4	2200	1410	3840	0.4	1750	1210	4600	0.4	2070	1350
12-#14	21	3930	0.5	1540	1040	4710	0.5	1840	1180	3710	0.5	1460	1010	4410	0.5	1720	1130
4x-4y	25	3770	0.7	924	626	4480	0.7	1100	705	3560	0.7	874	604	4190	0.7	1030	675
	40	3040	0.9	308	208	3440	0.9	367	235	2850	0.9	291	201	3200	0.9	344	225
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1310	964	8.40	7.20	1310	964	8.40	7.20	1210	886	8.40	7.20	1210	886	8.40	7.20

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 28

Designation		W 12 x230								W 12 x210							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.47 %	0	3100	0.0	1470	953	3910	0.0	1900	1140	2930	0.0	1360	906	3670	0.0	1750	1080
Ar(in²)	11	3040	0.2	1320	858	3800	0.2	1710	1030	2870	0.2	1220	816	3570	0.2	1570	971
= 3.16	13	3010	0.3	1150	750	3760	0.3	1490	900	2840	0.3	1070	714	3530	0.3	1380	850
	17	2940	0.4	989	643	3660	0.4	1280	772	2780	0.4	914	612	3430	0.4	1180	728
4-# 8	21	2860	0.5	824	536	3530	0.5	1070	643	2700	0.5	762	510	3310	0.5	982	607
2x-2y	25	2770	0.7	494	321	3380	0.7	639	386	2610	0.7	457	306	3170	0.7	589	364
	40	2310	0.9	164	107	2690	0.9	213	128	2170	0.9	152	102	2520	0.9	196	121
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1130	826	8.40	7.20	1130	826	8.40	7.20	1040	767	8.40	7.20	1040	767	8.40	7.20
.93 %	0	3210	0.0	1620	1080	4020	0.0	2050	1270	3040	0.0	1510	1030	3770	0.0	1900	1200
Ar(in²)	11	3140	0.2	1450	967	3900	0.2	1840	1140	2970	0.2	1350	925	3660	0.2	1710	1080
= 6.24	13	3110	0.3	1270	846	3860	0.3	1610	996	2940	0.3	1190	809	3620	0.3	1490	946
	17	3040	0.4	1090	725	3750	0.4	1380	854	2870	0.4	1020	694	3520	0.4	1280	810
4-#11	21	2950	0.5	908	604	3610	0.5	1150	711	2790	0.5	846	578	3390	0.5	1070	675
2x-2y	25	2850	0.7	545	362	3460	0.7	690	427	2690	0.7	508	347	3240	0.7	640	405
	40	2360	0.9	181	120	2740	0.9	230	142	2220	0.9	169	115	2560	0.9	213	135
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1120	826	8.40	7.20	1120	826	8.40	7.20	1040	766	8.40	7.20	1040	766	8.40	7.20
1.86 %	0	3420	0.0	1930	1230	4230	0.0	2360	1420	3250	0.0	1820	1190	3990	0.0	2210	1360
Ar(in²)	11	3340	0.2	1740	1110	4100	0.2	2120	1280	3170	0.2	1640	1070	3860	0.2	1990	1220
=12.48	13	3310	0.3	1520	971	4050	0.3	1860	1120	3140	0.3	1430	935	3820	0.3	1740	1070
	17	3230	0.4	1300	832	3930	0.4	1590	961	3060	0.4	1230	801	3700	0.4	1490	918
8-#11	21	3130	0.5	1080	694	3780	0.5	1330	801	2960	0.5	1020	668	3560	0.5	1240	765
4x-2y	25	3010	0.7	650	416	3610	0.7	795	480	2850	0.7	613	400	3400	0.7	745	459
	40	2470	0.9	216	138	2820	0.9	265	160	2330	0.9	204	133	2640	0.9	248	153
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1120	824	8.40	7.20	1120	824	8.40	7.20	1040	765	8.40	7.20	1040	765	8.40	7.20
3.02 %	0	3690	0.0	2100	1570	4500	0.0	2530	1760	3520	0.0	2000	1520	4250	0.0	2380	1700
Ar(in²)	11	3590	0.2	1890	1410	4350	0.2	2270	1580	3420	0.2	1800	1370	4120	0.2	2140	1530
=20.32	13	3560	0.3	1660	1240	4300	0.3	1990	1390	3390	0.3	1570	1200	4060	0.3	1870	1340
	17	3460	0.4	1420	1060	4160	0.4	1710	1190	3300	0.4	1350	1030	3930	0.4	1610	1150
16-#10	21	3350	0.5	1180	883	3990	0.5	1420	990	3180	0.5	1120	857	3770	0.5	1340	954
4x-6y	25	3210	0.7	709	529	3800	0.7	852	594	3050	0.7	673	514	3580	0.7	802	572
	40	2590	0.9	236	176	2920	0.9	284	198	2450	0.9	224	171	2740	0.9	267	190
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1120	823	8.40	7.20	1120	823	8.40	7.20	1040	763	8.40	7.20	1040	763	8.40	7.20
4.02 %	0	3920	0.0	2470	1740	4720	0.0	2900	1930	3750	0.0	2360	1700	4480	0.0	2750	1870
Ar(in²)	11	3810	0.2	2230	1570	4570	0.2	2610	1740	3640	0.2	2130	1530	4330	0.2	2480	1680
=27.00	13	3770	0.3	1950	1370	4500	0.3	2280	1520	3600	0.3	1860	1340	4270	0.3	2170	1470
	17	3660	0.4	1670	1180	4350	0.4	1960	1300	3490	0.4	1600	1140	4120	0.4	1860	1260
12-#14	21	3530	0.5	1390	979	4170	0.5	1630	1090	3370	0.5	1330	953	3950	0.5	1550	1050
4x-4y	25	3380	0.7	834	587	3960	0.7	979	652	3220	0.7	797	572	3740	0.7	929	630
	40	2690	0.9	278	195	3000	0.9	326	217	2540	0.9	265	190	2820	0.9	309	210
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1120	821	8.40	7.20	1120	821	8.40	7.20	1040	762	8.40	7.20	1040	762	8.40	7.20

Notes : 1. Cex = Pex$(KxLx)^2$/10000. (kip-ft²), Cey = Pey$(KyLy)^2$/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 24 x 28

Designation		W 12 x190								W 12 x170							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.47 %	0	2760	0.0	1250	859	3420	0.0	1600	1020	2590	0.0	1140	811	3180	0.0	1460	956
$A_r(in^2)$	11	2690	0.2	1120	773	3320	0.2	1440	915	2530	0.2	1030	730	3090	0.2	1310	860
= 3.16	13	2670	0.3	981	676	3290	0.3	1260	801	2500	0.3	898	639	3060	0.3	1150	752
	17	2610	0.4	841	580	3190	0.4	1080	686	2450	0.4	769	548	2970	0.4	983	645
4-# 8	21	2530	0.5	701	483	3080	0.5	900	572	2370	0.5	641	456	2860	0.5	819	537
2x-2y	25	2450	0.7	420	290	2950	0.7	540	343	2290	0.7	384	274	2740	0.7	491	322
	40	2030	0.9	140	96	2340	0.9	180	114	1890	0.9	128	91	2160	0.9	163	107
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		961	706	8.40	7.20	961	706	8.40	7.20	882	648	8.40	7.20	882	648	8.40	7.20
.93 %	0	2860	0.0	1400	981	3530	0.0	1750	1140	2690	0.0	1290	933	3290	0.0	1610	1080
$A_r(in^2)$	11	2800	0.2	1260	883	3420	0.2	1580	1030	2630	0.2	1160	840	3190	0.2	1450	969
= 6.24	13	2770	0.3	1100	772	3380	0.3	1380	897	2600	0.3	1020	735	3150	0.3	1270	848
	17	2700	0.4	942	662	3290	0.4	1180	768	2540	0.4	871	630	3060	0.4	1080	727
4-#11	21	2620	0.5	785	552	3160	0.5	984	640	2460	0.5	726	525	2950	0.5	903	606
2x-2y	25	2530	0.7	471	331	3020	0.7	590	384	2370	0.7	435	315	2810	0.7	542	363
	40	2080	0.9	157	110	2380	0.9	196	128	1940	0.9	145	105	2200	0.9	180	121
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		960	706	8.40	7.20	960	706	8.40	7.20	881	647	8.40	7.20	881	647	8.40	7.20
1.86 %	0	3080	0.0	1710	1140	3740	0.0	2060	1300	2910	0.0	1600	1090	3500	0.0	1920	1240
$A_r(in^2)$	11	3000	0.2	1540	1030	3620	0.2	1860	1170	2830	0.2	1440	983	3390	0.2	1730	1110
=12.48	13	2970	0.3	1350	898	3580	0.3	1630	1020	2800	0.3	1260	860	3350	0.3	1510	973
	17	2890	0.4	1150	769	3470	0.4	1390	876	2730	0.4	1080	737	3240	0.4	1300	834
8-#11	21	2800	0.5	962	641	3330	0.5	1160	730	2640	0.5	902	614	3110	0.5	1080	695
4x-2y	25	2690	0.7	577	384	3180	0.7	696	438	2530	0.7	541	368	2960	0.7	648	417
	40	2180	0.9	192	128	2460	0.9	232	146	2040	0.9	180	122	2290	0.9	216	139
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		959	704	8.40	7.20	959	704	8.40	7.20	879	646	8.40	7.20	879	646	8.40	7.20
3.02 %	0	3340	0.0	1890	1480	4010	0.0	2230	1630	3180	0.0	1790	1430	3770	0.0	2090	1570
$A_r(in^2)$	11	3250	0.2	1700	1330	3870	0.2	2010	1470	3080	0.2	1610	1290	3640	0.2	1880	1420
=20.32	13	3210	0.3	1490	1160	3820	0.3	1760	1290	3050	0.3	1410	1130	3590	0.3	1650	1240
	17	3130	0.4	1280	997	3700	0.4	1510	1100	2960	0.4	1210	965	3470	0.4	1410	1060
16-#10	21	3020	0.5	1060	831	3540	0.5	1260	919	2850	0.5	1010	804	3320	0.5	1180	884
4x-6y	25	2890	0.7	638	498	3360	0.7	754	551	2730	0.7	604	482	3150	0.7	706	530
	40	2300	0.9	212	166	2560	0.9	251	183	2150	0.9	201	160	2380	0.9	235	176
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		956	703	8.40	7.20	956	703	8.40	7.20	877	644	8.40	7.20	877	644	8.40	7.20
4.02 %	0	3570	0.0	2260	1650	4240	0.0	2610	1810	3400	0.0	2150	1600	4000	0.0	2460	1740
$A_r(in^2)$	11	3470	0.2	2030	1480	4090	0.2	2350	1620	3300	0.2	1930	1440	3850	0.2	2220	1570
=27.00	13	3420	0.3	1780	1300	4030	0.3	2050	1420	3260	0.3	1690	1260	3800	0.3	1940	1370
	17	3320	0.4	1520	1110	3890	0.4	1760	1220	3160	0.4	1450	1080	3660	0.4	1660	1180
12-#14	21	3200	0.5	1270	927	3720	0.5	1470	1020	3030	0.5	1210	901	3490	0.5	1390	980
4x-4y	25	3050	0.7	761	556	3520	0.7	880	609	2890	0.7	725	540	3300	0.7	831	588
	40	2390	0.9	253	185	2630	0.9	293	203	2240	0.9	241	180	2450	0.9	277	196
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		954	701	8.40	7.20	954	701	8.40	7.20	875	643	8.40	7.20	875	643	8.40	7.20

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 28

Designation		W 12 x152								W 12 x136							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.47 %	0	2440	0.0	1050	768	2970	0.0	1330	900	2300	0.0	961	726	2770	0.0	1210	847
Ar(in^2)	11	2380	0.2	942	691	2880	0.2	1200	810	2240	0.2	865	654	2690	0.2	1090	763
= 3.16	13	2350	0.3	824	604	2850	0.3	1050	708	2220	0.3	757	572	2660	0.3	953	667
	17	2300	0.4	706	518	2760	0.4	896	607	2160	0.4	649	490	2580	0.4	816	572
4-# 8	21	2230	0.5	588	432	2660	0.5	746	506	2100	0.5	540	408	2480	0.5	680	476
2x-2y	25	2150	0.7	353	259	2550	0.7	448	303	2020	0.7	324	245	2370	0.7	408	286
	40	1760	0.9	117	86	2000	0.9	149	101	1650	0.9	108	81	1860	0.9	136	95
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		809	594	8.40	7.20	809	594	8.40	7.20	743	546	8.40	7.20	743	546	8.40	7.20
.93 %	0	2540	0.0	1200	890	3070	0.0	1480	1020	2400	0.0	1110	848	2880	0.0	1360	969
Ar(in^2)	11	2480	0.2	1080	801	2980	0.2	1330	919	2340	0.2	1000	763	2790	0.2	1220	872
= 6.24	13	2450	0.3	942	700	2940	0.3	1160	804	2310	0.3	875	668	2750	0.3	1070	763
	17	2390	0.4	808	600	2850	0.4	997	689	2260	0.4	750	572	2670	0.4	918	654
4-#11	21	2320	0.5	673	500	2750	0.5	831	574	2180	0.5	625	477	2570	0.5	765	545
2x-2y	25	2230	0.7	404	300	2620	0.7	498	344	2100	0.7	375	286	2450	0.7	459	327
	40	1810	0.9	134	100	2040	0.9	166	114	1700	0.9	125	95	1900	0.9	153	109
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		808	594	8.40	7.20	808	594	8.40	7.20	742	545	8.40	7.20	742	545	8.40	7.20
1.86 %	0	2750	0.0	1510	1050	3290	0.0	1790	1180	2610	0.0	1430	1010	3090	0.0	1670	1130
Ar(in^2)	11	2680	0.2	1360	944	3180	0.2	1610	1060	2540	0.2	1280	907	2990	0.2	1510	1020
=12.48	13	2650	0.3	1190	826	3140	0.3	1410	930	2510	0.3	1120	794	2950	0.3	1320	889
	17	2580	0.4	1020	708	3040	0.4	1210	797	2440	0.4	962	680	2850	0.4	1130	762
8-#11	21	2490	0.5	849	590	2910	0.5	1010	664	2360	0.5	802	567	2730	0.5	941	635
4x-2y	25	2390	0.7	509	354	2770	0.7	604	398	2260	0.7	481	340	2590	0.7	565	381
	40	1910	0.9	169	118	2120	0.9	201	132	1790	0.9	160	113	1980	0.9	188	127
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		806	592	8.40	7.20	806	592	8.40	7.20	740	544	8.40	7.20	740	544	8.40	7.20
3.02 %	0	3020	0.0	1700	1390	3550	0.0	1970	1520	2880	0.0	1620	1350	3360	0.0	1860	1470
Ar(in^2)	11	2930	0.2	1530	1250	3430	0.2	1770	1370	2790	0.2	1460	1210	3240	0.2	1670	1320
=20.32	13	2900	0.3	1340	1090	3380	0.3	1550	1190	2760	0.3	1280	1060	3190	0.3	1460	1150
	17	2810	0.4	1150	936	3260	0.4	1330	1020	2670	0.4	1100	908	3070	0.4	1250	989
16-#10	21	2700	0.5	957	780	3120	0.5	1110	853	2570	0.5	912	757	2940	0.5	1040	824
4x-6y	25	2580	0.7	574	468	2950	0.7	664	512	2450	0.7	547	454	2780	0.7	626	494
	40	2020	0.9	191	156	2210	0.9	221	170	1900	0.9	182	151	2060	0.9	208	164
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		804	591	8.40	7.20	804	591	8.40	7.20	738	542	8.40	7.20	738	542	8.40	7.20
4.02 %	0	3250	0.0	2060	1560	3780	0.0	2340	1690	3110	0.0	1970	1520	3590	0.0	2220	1640
Ar(in^2)	11	3150	0.2	1850	1400	3640	0.2	2100	1520	3010	0.2	1770	1370	3450	0.2	2000	1470
=27.00	13	3100	0.3	1620	1230	3590	0.3	1840	1330	2970	0.3	1550	1200	3390	0.3	1750	1290
	17	3000	0.4	1390	1050	3450	0.4	1580	1140	2870	0.4	1330	1020	3260	0.4	1500	1110
12-#14	21	2880	0.5	1160	876	3290	0.5	1310	949	2750	0.5	1110	853	3100	0.5	1250	920
4x-4y	25	2740	0.7	693	526	3100	0.7	788	569	2610	0.7	665	512	2920	0.7	749	552
	40	2110	0.9	231	175	2280	0.9	262	189	1980	0.9	221	170	2130	0.9	249	184
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		802	589	8.40	7.20	802	589	8.40	7.20	736	541	8.40	7.20	736	541	8.40	7.20

Notes : 1. Cex = $Pex(KxLx)^2/10000$. (kip-ft^2), Cey = $Pey(KyLy)^2/10000$. (kip-ft^2), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 28

Designation		W 12 x120								W 12 x106							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.47 %	0	2160	0.0	881	685	2580	0.0	1100	796	2040	0.0	811	647	2410	0.0	1000	751
Ar(in²)	11	2110	0.2	792	616	2500	0.2	988	716	1990	0.2	730	582	2340	0.2	902	675
= 3.16	13	2090	0.3	693	539	2470	0.3	865	627	1970	0.3	638	509	2310	0.3	789	591
	17	2030	0.4	594	462	2400	0.4	741	537	1920	0.4	547	437	2240	0.4	676	506
4-# 8	21	1970	0.5	495	385	2310	0.5	618	448	1850	0.5	456	364	2150	0.5	563	422
2x-2y	25	1890	0.7	297	231	2200	0.7	370	268	1780	0.7	273	218	2050	0.7	338	253
	40	1540	0.9	99	77	1720	0.9	123	89	1440	0.9	91	72	1590	0.9	112	84
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		680	499	8.40	7.20	680	499	8.40	7.20	624	458	8.40	7.20	624	458	8.40	7.20
.93 %	0	2270	0.0	1030	807	2690	0.0	1250	918	2150	0.0	961	769	2520	0.0	1150	873
Ar(in²)	11	2210	0.2	928	726	2600	0.2	1120	826	2090	0.2	865	692	2440	0.2	1040	785
= 6.24	13	2180	0.3	812	636	2570	0.3	983	723	2070	0.3	757	606	2410	0.3	907	687
	17	2130	0.4	696	545	2490	0.4	843	620	2010	0.4	649	519	2330	0.4	778	589
4-#11	21	2050	0.5	580	454	2390	0.5	702	516	1940	0.5	540	433	2240	0.5	648	491
2x-2y	25	1970	0.7	348	272	2280	0.7	421	310	1860	0.7	324	259	2130	0.7	389	294
	40	1590	0.9	116	90	1760	0.9	140	103	1480	0.9	108	86	1630	0.9	129	98
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		679	499	8.40	7.20	679	499	8.40	7.20	623	457	8.40	7.20	623	457	8.40	7.20
1.86 %	0	2480	0.0	1350	967	2900	0.0	1560	1080	2360	0.0	1280	930	2730	0.0	1470	1030
Ar(in²)	11	2410	0.2	1210	870	2800	0.2	1410	970	2290	0.2	1150	837	2640	0.2	1320	929
=12.48	13	2380	0.3	1060	762	2760	0.3	1230	848	2260	0.3	1000	732	2600	0.3	1150	813
	17	2310	0.4	908	653	2670	0.4	1050	727	2190	0.4	860	627	2510	0.4	989	697
8-#11	21	2230	0.5	756	544	2560	0.5	879	606	2110	0.5	717	523	2400	0.5	824	580
4x-2y	25	2130	0.7	454	326	2420	0.7	527	363	2010	0.7	430	313	2270	0.7	494	348
	40	1680	0.9	151	108	1830	0.9	175	121	1570	0.9	143	104	1710	0.9	164	116
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		677	497	8.40	7.20	677	497	8.40	7.20	621	456	8.40	7.20	621	456	8.40	7.20
3.02 %	0	2750	0.0	1550	1310	3170	0.0	1750	1410	2630	0.0	1480	1270	3000	0.0	1660	1370
Ar(in²)	11	2660	0.2	1390	1170	3050	0.2	1580	1270	2540	0.2	1330	1140	2890	0.2	1500	1230
=20.32	13	2620	0.3	1220	1030	3000	0.3	1380	1110	2510	0.3	1170	998	2840	0.3	1310	1080
	17	2540	0.4	1040	880	2890	0.4	1180	955	2420	0.4	1000	855	2730	0.4	1120	924
16-#10	21	2440	0.5	869	734	2760	0.5	985	795	2320	0.5	833	713	2600	0.5	934	770
4x-6y	25	2320	0.7	521	440	2600	0.7	591	477	2200	0.7	500	427	2450	0.7	560	462
	40	1780	0.9	173	146	1920	0.9	197	159	1670	0.9	166	142	1780	0.9	186	154
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		675	496	8.40	7.20	675	496	8.40	7.20	619	454	8.40	7.20	619	454	8.40	7.20
4.02 %	0	2980	0.0	1890	1480	3400	0.0	2110	1590	2860	0.0	1820	1440	3230	0.0	2010	1540
Ar(in²)	11	2870	0.2	1700	1330	3260	0.2	1900	1430	2750	0.2	1640	1300	3090	0.2	1810	1390
=27.00	13	2830	0.3	1490	1160	3210	0.3	1660	1250	2710	0.3	1430	1130	3040	0.3	1580	1210
	17	2730	0.4	1280	997	3080	0.4	1420	1070	2610	0.4	1230	972	2920	0.4	1360	1040
12-#14	21	2610	0.5	1060	831	2930	0.5	1190	892	2490	0.5	1020	810	2770	0.5	1130	867
4x-4y	25	2470	0.7	638	498	2750	0.7	711	535	2350	0.7	614	486	2590	0.7	679	520
	40	1850	0.9	212	166	1980	0.9	237	178	1740	0.9	204	162	1840	0.9	226	173
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		673	494	8.40	7.20	673	494	8.40	7.20	617	453	8.40	7.20	617	453	8.40	7.20

Notes : 1. Cex = $Pex(KxLx)^2/10000$. (kip-ft²), Cey = $Pey(KyLy)^2/10000$. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 28

Designation		W 12 x 96								W							
Fy (ksi)		36				50											
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy								
.47 %	0	1960	0.0	761	618	2290	0.0	933	716								
Ar(in^2)	11	1900	0.2	685	556	2220	0.2	840	644								
= 3.16	13	1880	0.3	599	487	2190	0.3	735	564								
	17	1830	0.4	513	417	2120	0.4	630	483								
4-# 8	21	1770	0.5	428	348	2040	0.5	525	402								
2x-2y	25	1700	0.7	256	208	1940	0.7	315	241								
	40	1360	0.9	85	69	1500	0.9	105	80								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		582	428	8.40	7.20	582	428	8.40	7.20								
.93 %	0	2060	0.0	911	741	2400	0.0	1080	838								
Ar(in^2)	11	2000	0.2	820	667	2320	0.2	975	754								
= 6.24	13	1980	0.3	717	583	2290	0.3	853	660								
	17	1920	0.4	615	500	2210	0.4	731	566								
4-#11	21	1860	0.5	512	416	2120	0.5	609	471								
2x-2y	25	1780	0.7	307	250	2020	0.7	365	283								
	40	1410	0.9	102	83	1540	0.9	121	94								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		581	427	8.40	7.20	581	427	8.40	7.20								
1.86 %	0	2270	0.0	1230	901	2610	0.0	1400	998								
Ar(in^2)	11	2200	0.2	1100	811	2520	0.2	1260	898								
=12.48	13	2180	0.3	965	709	2480	0.3	1100	786								
	17	2110	0.4	827	608	2390	0.4	943	673								
8-#11	21	2030	0.5	689	507	2290	0.5	786	561								
4x-2y	25	1930	0.7	413	304	2160	0.7	471	336								
	40	1490	0.9	137	101	1610	0.9	157	112								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		580	426	8.40	7.20	580	426	8.40	7.20								
3.02 %	0	2540	0.0	1430	1240	2880	0.0	1600	1340								
Ar(in^2)	11	2450	0.2	1290	1120	2760	0.2	1440	1200								
=20.32	13	2420	0.3	1130	976	2720	0.3	1260	1050								
	17	2330	0.4	968	836	2610	0.4	1080	901								
16-#10	21	2230	0.5	806	697	2480	0.5	898	751								
4x-6y	25	2110	0.7	484	418	2340	0.7	539	450								
	40	1590	0.9	161	139	1690	0.9	179	150								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		577	424	8.40	7.20	577	424	8.40	7.20								
4.02 %	0	2770	0.0	1770	1410	3110	0.0	1940	1510								
Ar(in^2)	11	2660	0.2	1590	1270	2970	0.2	1750	1360								
=27.00	13	2620	0.3	1390	1110	2920	0.3	1530	1190								
	17	2520	0.4	1200	953	2800	0.4	1310	1020								
12-#14	21	2400	0.5	996	794	2650	0.5	1090	848								
4x-4y	25	2260	0.7	597	476	2480	0.7	655	508								
	40	1650	0.9	199	158	1740	0.9	218	169								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		575	423	8.40	7.20	575	423	8.40	7.20								

Notes :
1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 28

Designation		W 10 x112								W 10 x100							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.47 %	0	2090	0.0	799	640	2480	0.0	971	734	1990	0.0	747	610	2340	0.0	899	698
Ar(in²)	11	2040	0.2	719	576	2410	0.2	874	660	1940	0.2	672	549	2270	0.2	809	628
= 3.16	13	2020	0.3	629	504	2380	0.3	765	578	1920	0.3	588	481	2240	0.3	708	549
	17	1970	0.4	539	432	2310	0.4	655	495	1870	0.4	504	412	2170	0.4	607	471
4-# 8	21	1900	0.5	449	360	2220	0.5	546	413	1800	0.5	420	343	2090	0.5	506	392
2x-2y	25	1830	0.7	269	216	2120	0.7	327	247	1730	0.7	252	206	1990	0.7	303	235
	40	1480	0.9	89	72	1650	0.9	109	82	1390	0.9	84	68	1540	0.9	101	78
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		647	475	8.40	7.20	647	475	8.40	7.20	599	440	8.40	7.20	599	440	8.40	7.20
.93 %	0	2200	0.0	949	762	2590	0.0	1120	856	2100	0.0	897	733	2450	0.0	1050	820
Ar(in²)	11	2140	0.2	854	686	2510	0.2	1010	770	2040	0.2	807	659	2370	0.2	944	738
= 6.24	13	2110	0.3	747	600	2470	0.3	883	674	2010	0.3	706	577	2340	0.3	826	645
	17	2060	0.4	640	514	2400	0.4	757	577	1960	0.4	605	494	2260	0.4	708	553
4-#11	21	1990	0.5	533	429	2300	0.5	630	481	1890	0.5	504	412	2170	0.5	590	461
2x-2y	25	1910	0.7	320	257	2190	0.7	378	288	1810	0.7	302	247	2060	0.7	354	276
	40	1530	0.9	106	85	1690	0.9	126	96	1440	0.9	100	82	1580	0.9	118	92
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		646	475	8.40	7.20	646	475	8.40	7.20	598	439	8.40	7.20	598	439	8.40	7.20
1.86 %	0	2410	0.0	1260	922	2800	0.0	1430	1020	2310	0.0	1210	893	2660	0.0	1360	979
Ar(in²)	11	2340	0.2	1140	830	2710	0.2	1290	914	2240	0.2	1090	804	2560	0.2	1230	881
=12.48	13	2310	0.3	994	726	2670	0.3	1130	799	2210	0.3	953	703	2530	0.3	1070	771
	17	2240	0.4	852	622	2580	0.4	968	685	2140	0.4	817	603	2440	0.4	920	661
8-#11	21	2160	0.5	710	519	2460	0.5	807	571	2060	0.5	680	502	2330	0.5	766	551
4x-2y	25	2060	0.7	426	311	2340	0.7	484	342	1960	0.7	408	301	2210	0.7	460	330
	40	1610	0.9	142	103	1760	0.9	161	114	1520	0.9	136	100	1650	0.9	153	110
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		644	473	8.40	7.20	644	473	8.40	7.20	596	438	8.40	7.20	596	438	8.40	7.20
3.02 %	0	2680	0.0	1450	1260	3070	0.0	1620	1350	2580	0.0	1400	1230	2930	0.0	1550	1320
Ar(in²)	11	2590	0.2	1300	1130	2950	0.2	1450	1220	2490	0.2	1260	1110	2810	0.2	1390	1190
=20.32	13	2560	0.3	1140	992	2910	0.3	1270	1070	2450	0.3	1100	969	2770	0.3	1220	1040
	17	2470	0.4	978	850	2800	0.4	1090	912	2370	0.4	944	830	2660	0.4	1040	888
16-#10	21	2370	0.5	815	708	2670	0.5	908	760	2270	0.5	787	692	2530	0.5	869	740
4x-6y	25	2250	0.7	489	425	2510	0.7	545	456	2150	0.7	472	415	2380	0.7	521	444
	40	1710	0.9	163	141	1840	0.9	181	152	1620	0.9	157	138	1730	0.9	173	148
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		642	471	8.40	7.20	642	471	8.40	7.20	594	436	8.40	7.20	594	436	8.40	7.20
4.02 %	0	2910	0.0	1810	1430	3300	0.0	1980	1520	2810	0.0	1750	1400	3160	0.0	1910	1490
Ar(in²)	11	2800	0.2	1630	1290	3160	0.2	1780	1370	2700	0.2	1580	1260	3020	0.2	1720	1340
=27.00	13	2760	0.3	1420	1130	3110	0.3	1560	1200	2660	0.3	1380	1110	2970	0.3	1500	1170
	17	2660	0.4	1220	967	2990	0.4	1340	1030	2560	0.4	1180	947	2850	0.4	1290	1010
12-#14	21	2540	0.5	1020	805	2830	0.5	1110	857	2440	0.5	987	789	2700	0.5	1070	837
4x-4y	25	2400	0.7	609	483	2660	0.7	667	514	2300	0.7	592	473	2520	0.7	643	502
	40	1790	0.9	203	161	1900	0.9	222	171	1690	0.9	197	157	1780	0.9	214	167
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		640	470	8.40	7.20	640	470	8.40	7.20	592	435	8.40	7.20	592	435	8.40	7.20

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 24

Designation		W 14 x233								W 14 x211							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.55 %	0	2980	0.0	1480	1020	3800	0.0	1950	1260	2790	0.0	1350	959	3530	0.0	1780	1170
Ar(in²)	11	2920	0.2	1330	918	3690	0.2	1760	1130	2730	0.2	1210	863	3430	0.2	1600	1050
= 3.16	13	2890	0.3	1160	803	3650	0.3	1540	988	2710	0.3	1060	755	3390	0.3	1400	922
	17	2830	0.4	997	688	3550	0.4	1320	847	2650	0.4	911	647	3300	0.4	1200	790
4-# 8	21	2750	0.5	831	574	3430	0.5	1100	706	2570	0.5	759	539	3190	0.5	1000	658
2x-2y	25	2660	0.7	498	344	3290	0.7	659	423	2490	0.7	455	323	3050	0.7	600	395
	40	2230	0.9	166	114	2630	0.9	219	141	2080	0.9	151	107	2430	0.9	200	131
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		814	814	7.20	7.20	814	814	7.20	7.20	748	748	7.20	7.20	748	748	7.20	7.20
1.08 %	0	3090	0.0	1600	1140	3900	0.0	2080	1380	2900	0.0	1470	1080	3630	0.0	1900	1290
Ar(in²)	11	3020	0.2	1440	1030	3790	0.2	1870	1240	2830	0.2	1330	973	3530	0.2	1710	1160
= 6.24	13	2990	0.3	1260	899	3750	0.3	1640	1080	2800	0.3	1160	851	3490	0.3	1500	1020
	17	2920	0.4	1080	771	3640	0.4	1400	929	2740	0.4	994	730	3390	0.4	1280	872
4-#11	21	2840	0.5	900	642	3520	0.5	1170	774	2660	0.5	828	608	3270	0.5	1070	727
2x-2y	25	2750	0.7	540	385	3370	0.7	700	464	2570	0.7	497	365	3130	0.7	641	436
	40	2290	0.9	180	128	2670	0.9	233	154	2140	0.9	165	121	2480	0.9	213	145
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		813	813	7.20	7.20	813	813	7.20	7.20	747	747	7.20	7.20	747	747	7.20	7.20
2.08 %	0	3280	0.0	1780	1300	4100	0.0	2250	1530	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	3200	0.2	1600	1170	3980	0.2	2030	1380	0	0.2	0	0	0	0.2	0	0
=12.00	13	3170	0.3	1400	1020	3930	0.3	1770	1210	0	0.3	0	0	0	0.3	0	0
	17	3100	0.4	1200	874	3810	0.4	1520	1030	0	0.4	0	0	0	0.4	0	0
20-# 7	21	3010	0.5	998	728	3670	0.5	1270	861	0	0.5	0	0	0	0.5	0	0
6x-6y	25	2900	0.7	599	437	3510	0.7	759	516	0	0.7	0	0	0	0.7	0	0
	40	2390	0.9	199	145	2750	0.9	253	172	0	0.9	0	0	0	0.9	0	0
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		812	812	7.20	7.20	812	812	7.20	7.20	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 24

Designation		W 14 x193								W 14 x176							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.55 %	0	2640	0.0	1250	912	3320	0.0	1640	1110	2500	0.0	1150	863	3110	0.0	1510	1040
Ar(in²)	11	2580	0.2	1130	820	3220	0.2	1480	995	2440	0.2	1040	777	3020	0.2	1360	937
= 3.16	13	2560	0.3	984	718	3190	0.3	1290	871	2420	0.3	907	680	2990	0.3	1190	820
	17	2500	0.4	843	615	3100	0.4	1110	746	2360	0.4	777	583	2910	0.4	1020	703
4-# 8	21	2430	0.5	703	513	2990	0.5	923	622	2290	0.5	648	485	2800	0.5	848	586
2x-2y	25	2350	0.7	421	307	2860	0.7	554	373	2220	0.7	388	291	2680	0.7	509	351
	40	1960	0.9	140	102	2280	0.9	184	124	1840	0.9	129	97	2130	0.9	169	117
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		696	696	7.20	7.20	696	696	7.20	7.20	645	645	7.20	7.20	645	645	7.20	7.20
1.08 %	0	2750	0.0	1370	1030	3420	0.0	1770	1230	2600	0.0	1280	985	3220	0.0	1630	1160
Ar(in²)	11	2680	0.2	1240	930	3320	0.2	1590	1110	2540	0.2	1150	887	3120	0.2	1470	1050
= 6.24	13	2660	0.3	1080	814	3280	0.3	1390	967	2510	0.3	1000	776	3090	0.3	1280	916
	17	2600	0.4	926	698	3190	0.4	1190	829	2460	0.4	860	665	3000	0.4	1100	785
4-#11	21	2520	0.5	772	581	3070	0.5	992	690	2380	0.5	717	554	2890	0.5	917	654
2x-2y	25	2430	0.7	463	349	2940	0.7	595	414	2300	0.7	430	332	2760	0.7	550	392
	40	2010	0.9	154	116	2320	0.9	198	138	1890	0.9	143	110	2170	0.9	183	130
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		695	695	7.20	7.20	695	695	7.20	7.20	645	645	7.20	7.20	645	645	7.20	7.20
2.08 %	0	2940	0.0	1580	1210	3620	0.0	1970	1410	2800	0.0	1480	1170	3410	0.0	1830	1340
Ar(in²)	11	2870	0.2	1420	1090	3510	0.2	1770	1270	2730	0.2	1330	1050	3310	0.2	1650	1210
=12.00	13	2840	0.3	1240	956	3460	0.3	1550	1110	2700	0.3	1160	918	3270	0.3	1440	1060
	17	2770	0.4	1060	820	3360	0.4	1330	950	2630	0.4	998	787	3170	0.4	1240	907
12-# 9	21	2680	0.5	886	683	3230	0.5	1110	792	2550	0.5	831	656	3040	0.5	1030	755
4x-4y	25	2580	0.7	531	410	3080	0.7	664	475	2450	0.7	499	393	2900	0.7	619	453
	40	2110	0.9	177	136	2400	0.9	221	158	1990	0.9	166	131	2250	0.9	206	151
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		694	694	7.20	7.20	694	694	7.20	7.20	643	643	7.20	7.20	643	643	7.20	7.20
3.13 %	0	3150	0.0	1680	1510	3820	0.0	2070	1700	3000	0.0	1580	1460	3620	0.0	1940	1630
Ar(in²)	11	3060	0.2	1510	1350	3700	0.2	1870	1530	2920	0.2	1430	1310	3500	0.2	1750	1470
=18.00	13	3030	0.3	1320	1190	3650	0.3	1630	1340	2890	0.3	1250	1150	3450	0.3	1530	1290
	17	2950	0.4	1130	1020	3530	0.4	1400	1150	2810	0.4	1070	983	3340	0.4	1310	1100
8-#14	21	2850	0.5	945	846	3390	0.5	1170	955	2710	0.5	891	819	3200	0.5	1090	919
2x-4y	25	2740	0.7	567	508	3230	0.7	699	573	2600	0.7	534	491	3040	0.7	654	551
	40	2200	0.9	189	169	2480	0.9	233	191	2080	0.9	178	163	2320	0.9	218	183
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		692	692	7.20	7.20	692	692	7.20	7.20	642	642	7.20	7.20	642	642	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 24

Designation		W 14 x159								W 14 x145							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.55 %	0	2350	0.0	1060	815	2900	0.0	1380	980	2230	0.0	978	776	2740	0.0	1270	928
Ar(in²)	11	2290	0.2	950	734	2820	0.2	1240	882	2180	0.2	880	698	2660	0.2	1150	835
= 3.16	13	2270	0.3	831	642	2790	0.3	1090	772	2160	0.3	770	611	2630	0.3	1000	731
	17	2220	0.4	712	550	2710	0.4	930	661	2110	0.4	660	523	2550	0.4	858	626
4-# 8	21	2150	0.5	594	458	2610	0.5	775	551	2040	0.5	550	436	2460	0.5	715	522
2x-2y	25	2080	0.7	356	275	2500	0.7	465	330	1970	0.7	330	261	2350	0.7	429	313
	40	1720	0.9	118	91	1980	0.9	155	110	1620	0.9	110	87	1860	0.9	143	104
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		594	594	7.20	7.20	594	594	7.20	7.20	553	553	7.20	7.20	553	553	7.20	7.20
1.08 %	0	2450	0.0	1180	937	3010	0.0	1500	1100	2340	0.0	1100	898	2840	0.0	1400	1050
Ar(in²)	11	2390	0.2	1060	844	2920	0.2	1350	991	2280	0.2	991	808	2760	0.2	1260	945
= 6.24	13	2370	0.3	928	738	2880	0.3	1180	867	2260	0.3	867	707	2720	0.3	1100	827
	17	2310	0.4	796	633	2800	0.4	1010	743	2200	0.4	743	606	2640	0.4	941	709
4-#11	21	2240	0.5	663	527	2690	0.5	844	619	2130	0.5	619	505	2540	0.5	784	591
2x-2y	25	2160	0.7	398	316	2570	0.7	506	371	2050	0.7	371	303	2430	0.7	470	354
	40	1770	0.9	132	105	2020	0.9	168	123	1670	0.9	123	101	1900	0.9	156	118
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		593	593	7.20	7.20	593	593	7.20	7.20	553	553	7.20	7.20	553	553	7.20	7.20
2.08 %	0	2650	0.0	1380	1120	3200	0.0	1700	1280	2530	0.0	1310	1080	3040	0.0	1600	1230
Ar(in²)	11	2580	0.2	1240	1010	3100	0.2	1530	1150	2460	0.2	1170	971	2940	0.2	1440	1110
=12.00	13	2550	0.3	1090	881	3060	0.3	1340	1010	2440	0.3	1030	850	2900	0.3	1260	969
	17	2490	0.4	933	755	2970	0.4	1150	865	2370	0.4	881	728	2810	0.4	1080	831
12-# 9	21	2400	0.5	777	629	2850	0.5	958	721	2290	0.5	734	607	2700	0.5	899	692
4x-4y	25	2310	0.7	466	377	2710	0.7	575	432	2200	0.7	440	364	2570	0.7	539	415
	40	1860	0.9	155	125	2090	0.9	191	144	1760	0.9	146	121	1970	0.9	179	138
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		592	592	7.20	7.20	592	592	7.20	7.20	552	552	7.20	7.20	552	552	7.20	7.20
3.13 %	0	2850	0.0	1490	1410	3410	0.0	1810	1570	2740	0.0	1410	1370	3250	0.0	1700	1520
Ar(in²)	11	2770	0.2	1340	1270	3290	0.2	1630	1420	2660	0.2	1270	1230	3130	0.2	1530	1370
=18.00	13	2740	0.3	1170	1110	3250	0.3	1420	1240	2630	0.3	1110	1080	3090	0.3	1340	1200
	17	2660	0.4	1010	951	3140	0.4	1220	1060	2550	0.4	954	924	2980	0.4	1150	1030
8-#14	21	2570	0.5	838	792	3010	0.5	1020	884	2460	0.5	795	770	2860	0.5	958	856
2x-4y	25	2460	0.7	502	475	2860	0.7	610	530	2350	0.7	477	462	2710	0.7	574	513
	40	1950	0.9	167	158	2160	0.9	203	176	1850	0.9	159	154	2040	0.9	191	171
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		591	591	7.20	7.20	591	591	7.20	7.20	550	550	7.20	7.20	550	550	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 3.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 24

Designation		W 14 x132								W 14 x120							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.55 %	0	2120	0.0	904	722	2580	0.0	1170	856	2020	0.0	839	688	2440	0.0	1080	813
Ar(in²)	11	2070	0.2	814	649	2500	0.2	1050	770	1970	0.2	755	619	2360	0.2	974	732
= 3.16	13	2050	0.3	712	568	2470	0.3	922	674	1950	0.3	660	542	2330	0.3	852	640
	17	2000	0.4	610	487	2400	0.4	790	577	1900	0.4	566	464	2270	0.4	730	549
4-# 8	21	1940	0.5	508	406	2310	0.5	659	481	1840	0.5	471	387	2180	0.5	608	457
2x-2y	25	1870	0.7	305	243	2210	0.7	395	288	1770	0.7	283	232	2080	0.7	365	274
	40	1530	0.9	101	81	1740	0.9	131	96	1450	0.9	94	77	1630	0.9	121	91
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		514	514	7.20	7.20	514	514	7.20	7.20	479	479	7.20	7.20	479	479	7.20	7.20
1.08 %	0	2220	0.0	1030	844	2680	0.0	1290	977	2120	0.0	962	810	2540	0.0	1210	935
Ar(in²)	11	2170	0.2	925	759	2600	0.2	1170	880	2070	0.2	866	729	2460	0.2	1090	841
= 6.24	13	2140	0.3	809	664	2570	0.3	1020	770	2040	0.3	757	638	2430	0.3	949	736
	17	2090	0.4	694	569	2490	0.4	874	660	1990	0.4	649	547	2360	0.4	813	631
4-#11	21	2020	0.5	578	474	2400	0.5	728	550	1930	0.5	541	456	2260	0.5	678	526
2x-2y	25	1950	0.7	347	284	2290	0.7	437	330	1850	0.7	324	273	2160	0.7	406	315
	40	1580	0.9	115	94	1780	0.9	145	110	1500	0.9	108	91	1670	0.9	135	105
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		513	513	7.20	7.20	513	513	7.20	7.20	478	478	7.20	7.20	478	478	7.20	7.20
2.08 %	0	2420	0.0	1230	1030	2880	0.0	1500	1160	2320	0.0	1170	992	2740	0.0	1410	1120
Ar(in²)	11	2350	0.2	1110	923	2790	0.2	1350	1040	2250	0.2	1050	892	2650	0.2	1270	1000
=12.00	13	2330	0.3	970	807	2750	0.3	1180	912	2230	0.3	918	781	2610	0.3	1110	879
	17	2260	0.4	831	692	2660	0.4	1010	782	2160	0.4	787	669	2520	0.4	951	753
12-# 9	21	2180	0.5	693	576	2550	0.5	842	651	2090	0.5	656	558	2420	0.5	792	628
4x-4y	25	2090	0.7	415	346	2420	0.7	505	391	2000	0.7	393	334	2290	0.7	475	376
	40	1670	0.9	138	115	1850	0.9	168	130	1580	0.9	131	111	1740	0.9	158	125
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		512	512	7.20	7.20	512	512	7.20	7.20	477	477	7.20	7.20	477	477	7.20	7.20
3.13 %	0	2620	0.0	1340	1320	3090	0.0	1600	1450	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	2550	0.2	1210	1180	2980	0.2	1440	1300	0	0.2	0	0	0	0.2	0	0
=18.00	13	2510	0.3	1060	1040	2930	0.3	1260	1140	0	0.3	0	0	0	0.3	0	0
	17	2440	0.4	906	888	2830	0.4	1080	978	0	0.4	0	0	0	0.4	0	0
8-#14	21	2350	0.5	755	740	2710	0.5	901	815	0	0.5	0	0	0	0.5	0	0
2x-4y	25	2240	0.7	453	444	2560	0.7	541	489	0	0.7	0	0	0	0.7	0	0
	40	1750	0.9	151	148	1920	0.9	180	163	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		511	511	7.20	7.20	511	511	7.20	7.20	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 24

Designation		W 14 x109								W 14 x 99							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.55 %	0	1920	0.0	777	656	2300	0.0	998	773	1840	0.0	722	625	2180	0.0	923	735
Ar(in²)	11	1870	0.2	699	590	2230	0.2	899	696	1790	0.2	650	563	2110	0.2	831	661
= 3.16	13	1850	0.3	612	516	2200	0.3	786	609	1770	0.3	569	492	2090	0.3	727	579
	17	1810	0.4	524	442	2140	0.4	674	522	1720	0.4	487	422	2020	0.4	623	496
4-# 8	21	1750	0.5	437	369	2060	0.5	561	435	1670	0.5	406	351	1950	0.5	519	413
2x-2y	25	1680	0.7	262	221	1960	0.7	337	261	1600	0.7	243	211	1860	0.7	311	248
	40	1370	0.9	87	73	1530	0.9	112	87	1300	0.9	81	70	1440	0.9	103	82
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		445	445	7.20	7.20	445	445	7.20	7.20	416	416	7.20	7.20	416	416	7.20	7.20
1.08 %	0	2020	0.0	900	778	2410	0.0	1120	895	1940	0.0	846	747	2290	0.0	1050	857
Ar(in²)	11	1970	0.2	810	700	2330	0.2	1010	805	1890	0.2	761	673	2210	0.2	942	771
= 6.24	13	1950	0.3	709	612	2300	0.3	883	704	1870	0.3	666	589	2180	0.3	824	675
	17	1900	0.4	608	525	2230	0.4	757	604	1820	0.4	571	504	2110	0.4	706	578
4-#11	21	1830	0.5	506	437	2140	0.5	631	503	1750	0.5	475	420	2030	0.5	588	482
2x-2y	25	1760	0.7	304	262	2040	0.7	378	302	1680	0.7	285	252	1930	0.7	353	289
	40	1420	0.9	101	87	1570	0.9	126	100	1340	0.9	95	84	1480	0.9	117	96
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		445	445	7.20	7.20	445	445	7.20	7.20	416	416	7.20	7.20	416	416	7.20	7.20
2.08 %	0	2220	0.0	1100	960	2600	0.0	1330	1080	2140	0.0	1050	929	2480	0.0	1250	1040
Ar(in²)	11	2160	0.2	994	864	2510	0.2	1190	968	2070	0.2	944	836	2400	0.2	1130	934
=12.00	13	2130	0.3	869	756	2480	0.3	1040	847	2050	0.3	826	732	2360	0.3	984	817
	17	2070	0.4	745	648	2390	0.4	894	726	1990	0.4	708	627	2280	0.4	844	701
12-# 9	21	1990	0.5	621	540	2290	0.5	745	605	1910	0.5	590	523	2180	0.5	703	584
4x-4y	25	1900	0.7	372	324	2170	0.7	447	363	1820	0.7	354	313	2070	0.7	422	350
	40	1500	0.9	124	108	1640	0.9	149	121	1420	0.9	118	104	1550	0.9	140	116
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		444	444	7.20	7.20	444	444	7.20	7.20	414	414	7.20	7.20	414	414	7.20	7.20
3.13 %	0	2430	0.0	1380	1080	2810	0.0	1600	1200	2340	0.0	1320	1050	2690	0.0	1520	1160
Ar(in²)	11	2350	0.2	1240	975	2700	0.2	1440	1080	2260	0.2	1190	948	2590	0.2	1370	1050
=18.00	13	2320	0.3	1090	853	2660	0.3	1260	944	2230	0.3	1040	829	2550	0.3	1200	914
	17	2240	0.4	930	731	2570	0.4	1080	809	2160	0.4	893	711	2450	0.4	1030	784
8-#14	21	2150	0.5	775	609	2450	0.5	899	674	2070	0.5	744	592	2330	0.5	857	653
4x-2y	25	2050	0.7	465	365	2310	0.7	539	404	1970	0.7	446	355	2200	0.7	514	392
	40	1580	0.9	155	121	1700	0.9	179	134	1500	0.9	148	118	1610	0.9	171	130
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		442	442	7.20	7.20	442	442	7.20	7.20	413	413	7.20	7.20	413	413	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. $Cex = Pex(KxLx)^2/10000.$ (kip-ft²), $Cey = Pey(KyLy)^2/10000.$ (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 3.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 24

Designation		W 14 x 90							
Fy (ksi)		36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.55 %	0	1760	0.0	672	596	2070	0.0	854	700
Ar(in²)	11	1710	0.2	605	537	2010	0.2	768	630
= 3.16	13	1690	0.3	529	470	1990	0.3	672	551
	17	1650	0.4	454	402	1920	0.4	576	472
4-# 8	21	1600	0.5	378	335	1850	0.5	480	393
2x-2y	25	1530	0.7	227	201	1760	0.7	288	236
	40	1230	0.9	75	67	1370	0.9	96	78
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		390	390	7.20	7.20	390	390	7.20	7.20
1.08 %	0	1860	0.0	796	719	2180	0.0	977	822
Ar(in²)	11	1810	0.2	716	647	2110	0.2	879	739
= 6.24	13	1790	0.3	627	566	2080	0.3	769	647
	17	1740	0.4	537	485	2010	0.4	659	554
4-#11	21	1680	0.5	447	404	1930	0.5	549	462
2x-2y	25	1610	0.7	268	242	1840	0.7	329	277
	40	1280	0.9	89	80	1400	0.9	109	92
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		389	389	7.20	7.20	389	389	7.20	7.20
2.08 %	0	2060	0.0	1000	901	2380	0.0	1180	1000
Ar(in²)	11	2000	0.2	900	811	2290	0.2	1060	903
=12.00	13	1970	0.3	787	709	2260	0.3	930	790
	17	1910	0.4	675	608	2180	0.4	797	677
12-# 9	21	1840	0.5	562	506	2080	0.5	664	564
4x-4y	25	1750	0.7	337	304	1970	0.7	398	338
	40	1360	0.9	112	101	1470	0.9	132	112
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		388	388	7.20	7.20	388	388	7.20	7.20
3.13 %	0	2270	0.0	1270	1030	2580	0.0	1460	1130
Ar(in²)	11	2190	0.2	1150	922	2480	0.2	1310	1010
=18.00	13	2160	0.3	1000	807	2440	0.3	1150	887
	17	2090	0.4	859	692	2350	0.4	982	760
8-#14	21	2000	0.5	716	576	2230	0.5	818	633
4x-2y	25	1890	0.7	429	346	2100	0.7	491	380
	40	1430	0.9	143	115	1530	0.9	163	126
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		387	387	7.20	7.20	387	387	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00

Designation		W 14 x 82							
Fy (ksi)		36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.55 %	0	1690	0.0	632	528	1980	0.0	797	595
Ar(in²)	11	1640	0.2	569	475	1910	0.2	718	536
= 3.16	13	1630	0.3	497	415	1890	0.3	628	469
	17	1580	0.4	426	356	1830	0.4	538	402
4-# 8	21	1530	0.5	355	297	1760	0.5	448	335
2x-2y	25	1470	0.7	213	178	1670	0.7	269	201
	40	1170	0.9	71	59	1290	0.9	89	67
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		366	366	7.20	7.20	366	366	7.20	7.20
1.08 %	0	1800	0.0	755	650	2080	0.0	921	718
Ar(in²)	11	1740	0.2	680	585	2010	0.2	829	646
= 6.24	13	1720	0.3	595	512	1990	0.3	725	565
	17	1670	0.4	510	438	1920	0.4	621	484
4-#11	21	1610	0.5	425	365	1840	0.5	518	403
2x-2y	25	1540	0.7	255	219	1750	0.7	310	242
	40	1220	0.9	85	73	1330	0.9	103	80
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		365	365	7.20	7.20	365	365	7.20	7.20
2.08 %	0	1990	0.0	959	832	2280	0.0	1130	899
Ar(in²)	11	1930	0.2	863	748	2200	0.2	1010	809
=12.00	13	1900	0.3	755	655	2160	0.3	885	708
	17	1840	0.4	647	561	2080	0.4	759	606
12-# 9	21	1770	0.5	539	468	1990	0.5	632	505
4x-4y	25	1680	0.7	323	280	1880	0.7	379	303
	40	1290	0.9	107	93	1390	0.9	126	101
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		364	364	7.20	7.20	364	364	7.20	7.20
3.13 %	0	2200	0.0	1230	955	2480	0.0	1400	1020
Ar(in²)	11	2120	0.2	1110	860	2380	0.2	1260	920
=18.00	13	2090	0.3	971	752	2350	0.3	1100	805
	17	2020	0.4	832	645	2250	0.4	943	690
8-#14	21	1930	0.5	693	537	2140	0.5	786	575
4x-2y	25	1820	0.7	416	322	2010	0.7	471	345
	40	1360	0.9	138	107	1450	0.9	157	115
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		363	363	7.20	7.20	363	363	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 24 x 24

Designation		W 12 x336								W 12 x305							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.55 %	0	3860	0.0	1950	1160	5040	0.0	2600	1450	3590	0.0	1780	1080	4660	0.0	2350	1340
Ar(in²)	11	3780	0.2	1760	1040	4900	0.2	2340	1310	3520	0.2	1600	974	4540	0.2	2120	1210
= 3.16	13	3750	0.3	1540	913	4850	0.3	2050	1140	3490	0.3	1400	853	4490	0.3	1850	1060
	17	3680	0.4	1320	783	4720	0.4	1750	978	3420	0.4	1200	731	4370	0.4	1590	906
4-# 8	21	3580	0.5	1100	652	4570	0.5	1460	815	3330	0.5	998	609	4220	0.5	1320	755
2x-2y	25	3470	0.7	659	391	4390	0.7	877	489	3230	0.7	599	365	4050	0.7	794	453
	40	2940	0.9	219	130	3530	0.9	292	163	2730	0.9	199	121	3260	0.9	264	151
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		1120	1120	7.20	7.20	1120	1120	7.20	7.20	1030	1030	7.20	7.20	1030	1030	7.20	7.20
1.08 %	0	3970	0.0	2080	1280	5140	0.0	2720	1570	3700	0.0	1900	1200	4770	0.0	2480	1460
Ar(in²)	11	3880	0.2	1870	1150	5000	0.2	2450	1410	3620	0.2	1710	1080	4640	0.2	2230	1320
= 6.24	13	3850	0.3	1630	1010	4950	0.3	2140	1240	3590	0.3	1490	948	4580	0.3	1950	1150
	17	3770	0.4	1400	865	4820	0.4	1840	1060	3510	0.4	1280	813	4460	0.4	1670	988
4-#11	21	3670	0.5	1170	721	4650	0.5	1530	884	3420	0.5	1070	677	4310	0.5	1390	823
2x-2y	25	3560	0.7	700	432	4460	0.7	918	530	3310	0.7	640	406	4130	0.7	835	494
	40	3000	0.9	233	144	3580	0.9	306	176	2780	0.9	213	135	3310	0.9	278	164
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1120	1120	7.20	7.20	1120	1120	7.20	7.20	1030	1030	7.20	7.20	1030	1030	7.20	7.20
2.17 %	0	4180	0.0	2240	1540	5360	0.0	2880	1830	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	4090	0.2	2010	1380	5200	0.2	2590	1640	0	0.2	0	0	0	0.2	0	0
=12.48	13	4050	0.3	1760	1210	5150	0.3	2270	1440	0	0.3	0	0	0	0.3	0	0
	17	3960	0.4	1510	1040	5000	0.4	1950	1230	0	0.4	0	0	0	0.4	0	0
8-#11	21	3850	0.5	1260	864	4830	0.5	1620	1030	0	0.5	0	0	0	0.5	0	0
2x-4y	25	3730	0.7	754	518	4620	0.7	972	616	0	0.7	0	0	0	0.7	0	0
	40	3110	0.9	251	172	3670	0.9	324	205	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1120	1120	7.20	7.20	1120	1120	7.20	7.20	0	0	.00	.00	0	0	.00	.00
3.13 %	0	4370	0.0	2380	1750	5540	0.0	3030	2040	4100	0.0	2200	1680	5170	0.0	2780	1940
Ar(in²)	11	4270	0.2	2140	1580	5380	0.2	2720	1840	4000	0.2	1980	1510	5010	0.2	2500	1740
=18.00	13	4230	0.3	1880	1380	5320	0.3	2380	1610	3970	0.3	1740	1320	4950	0.3	2190	1520
	17	4130	0.4	1610	1180	5170	0.4	2040	1380	3870	0.4	1490	1130	4810	0.4	1880	1310
8-#14	21	4010	0.5	1340	985	4980	0.5	1700	1150	3760	0.5	1240	942	4630	0.5	1560	1090
2x-4y	25	3870	0.7	803	591	4760	0.7	1020	689	3630	0.7	743	565	4420	0.7	938	653
	40	3210	0.9	267	197	3750	0.9	340	229	2990	0.9	247	188	3470	0.9	312	217
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		1120	1120	7.20	7.20	1120	1120	7.20	7.20	1020	1020	7.20	7.20	1020	1020	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes :
1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 24 x 24

Designation		W 12 x279								W 12 x252							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.55 %	0	3370	0.0	1620	1020	4340	0.0	2140	1250	3140	0.0	1480	955	4030	0.0	1940	1160
Ar(in²)	11	3300	0.2	1460	916	4230	0.2	1930	1130	3080	0.2	1330	859	3920	0.2	1750	1050
= 3.16	13	3270	0.3	1280	802	4180	0.3	1690	986	3050	0.3	1160	752	3870	0.3	1530	916
	17	3200	0.4	1100	687	4070	0.4	1450	845	2990	0.4	997	644	3770	0.4	1310	785
4-# 8	21	3120	0.5	913	572	3930	0.5	1210	704	2910	0.5	830	537	3640	0.5	1090	654
2x-2y	25	3020	0.7	548	343	3770	0.7	723	422	2810	0.7	498	322	3490	0.7	655	392
	40	2550	0.9	182	114	3030	0.9	241	140	2370	0.9	166	107	2800	0.9	218	130
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		949	949	7.20	7.20	949	949	7.20	7.20	870	870	7.20	7.20	870	870	7.20	7.20
1.08 %	0	3480	0.0	1750	1140	4450	0.0	2270	1370	3250	0.0	1600	1080	4130	0.0	2070	1290
Ar(in²)	11	3400	0.2	1570	1030	4330	0.2	2040	1240	3180	0.2	1440	969	4020	0.2	1860	1160
= 6.24	13	3370	0.3	1380	897	4280	0.3	1790	1080	3150	0.3	1260	847	3970	0.3	1630	1010
	17	3300	0.4	1180	769	4160	0.4	1530	927	3080	0.4	1080	726	3860	0.4	1390	867
4-#11	21	3210	0.5	982	641	4020	0.5	1280	773	3000	0.5	899	605	3730	0.5	1160	723
2x-2y	25	3100	0.7	589	384	3850	0.7	765	463	2900	0.7	539	363	3570	0.7	697	433
	40	2600	0.9	196	128	3080	0.9	255	154	2420	0.9	179	121	2840	0.9	232	144
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		948	948	7.20	7.20	948	948	7.20	7.20	870	870	7.20	7.20	870	870	7.20	7.20
2.08 %	0	3670	0.0	1950	1320	4650	0.0	2470	1550	3450	0.0	1800	1260	4330	0.0	2270	1470
Ar(in²)	11	3590	0.2	1750	1190	4510	0.2	2220	1400	3360	0.2	1620	1130	4200	0.2	2040	1320
=12.00	13	3560	0.3	1530	1040	4460	0.3	1940	1220	3330	0.3	1420	990	4150	0.3	1790	1150
	17	3480	0.4	1320	891	4330	0.4	1670	1050	3260	0.4	1220	848	4030	0.4	1530	989
12-# 9	21	3380	0.5	1100	742	4180	0.5	1390	874	3160	0.5	1010	707	3880	0.5	1280	824
4x-4y	25	3260	0.7	657	445	4000	0.7	833	524	3050	0.7	608	424	3710	0.7	765	494
	40	2710	0.9	219	148	3160	0.9	277	174	2520	0.9	202	141	2920	0.9	255	164
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		947	947	7.20	7.20	947	947	7.20	7.20	868	868	7.20	7.20	868	868	7.20	7.20
3.13 %	0	3880	0.0	2050	1610	4850	0.0	2570	1840	3650	0.0	1910	1550	4530	0.0	2370	1760
Ar(in²)	11	3780	0.2	1850	1450	4710	0.2	2320	1660	3560	0.2	1720	1390	4390	0.2	2130	1580
=18.00	13	3750	0.3	1620	1270	4650	0.3	2030	1450	3520	0.3	1500	1220	4340	0.3	1870	1380
	17	3660	0.4	1390	1090	4510	0.4	1740	1250	3440	0.4	1290	1040	4210	0.4	1600	1190
8-#14	21	3550	0.5	1150	906	4340	0.5	1450	1040	3330	0.5	1070	870	4050	0.5	1330	987
2x-4y	25	3420	0.7	692	543	4140	0.7	868	622	3210	0.7	643	522	3860	0.7	800	592
	40	2810	0.9	230	181	3240	0.9	289	207	2620	0.9	214	174	3000	0.9	266	197
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		946	946	7.20	7.20	946	946	7.20	7.20	867	867	7.20	7.20	867	867	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 24

Designation		W 12 x230								W 12 x210							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.55 %	0	2960	0.0	1360	904	3760	0.0	1780	1090	2790	0.0	1250	858	3520	0.0	1640	1030
Ar(in²)	11	2890	0.2	1220	814	3660	0.2	1610	984	2720	0.2	1130	772	3420	0.2	1470	926
= 3.16	13	2870	0.3	1070	712	3620	0.3	1400	861	2700	0.3	987	676	3390	0.3	1290	811
	17	2810	0.4	918	610	3520	0.4	1200	738	2640	0.4	846	579	3290	0.4	1110	695
4-# 8	21	2730	0.5	765	509	3400	0.5	1000	615	2570	0.5	705	483	3180	0.5	920	579
2x-2y	25	2640	0.7	459	305	3260	0.7	602	369	2480	0.7	423	289	3050	0.7	552	347
	40	2210	0.9	153	101	2600	0.9	200	123	2080	0.9	141	96	2430	0.9	184	115
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		806	806	7.20	7.20	806	806	7.20	7.20	746	746	7.20	7.20	746	746	7.20	7.20
1.08 %	0	3060	0.0	1480	1030	3870	0.0	1910	1220	2890	0.0	1380	980	3630	0.0	1760	1150
Ar(in²)	11	2990	0.2	1340	923	3760	0.2	1720	1090	2830	0.2	1240	882	3520	0.2	1580	1040
= 6.24	13	2970	0.3	1170	808	3720	0.3	1500	957	2800	0.3	1080	772	3480	0.3	1390	906
	17	2900	0.4	1000	692	3610	0.4	1290	820	2740	0.4	928	661	3380	0.4	1190	777
4-#11	21	2820	0.5	834	577	3490	0.5	1070	683	2660	0.5	774	551	3260	0.5	989	647
2x-2y	25	2720	0.7	500	346	3340	0.7	643	410	2570	0.7	464	330	3120	0.7	593	388
	40	2270	0.9	166	115	2650	0.9	214	136	2130	0.9	154	110	2470	0.9	197	129
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		805	805	7.20	7.20	805	805	7.20	7.20	745	745	7.20	7.20	745	745	7.20	7.20
2.08 %	0	3260	0.0	1690	1210	4060	0.0	2110	1400	3090	0.0	1580	1160	3820	0.0	1960	1330
Ar(in²)	11	3180	0.2	1520	1090	3940	0.2	1900	1260	3010	0.2	1420	1050	3710	0.2	1770	1200
=12.00	13	3150	0.3	1330	950	3900	0.3	1660	1100	2980	0.3	1240	914	3660	0.3	1550	1050
	17	3080	0.4	1140	814	3780	0.4	1420	942	2910	0.4	1070	783	3550	0.4	1320	899
12-# 9	21	2980	0.5	948	679	3640	0.5	1190	785	2820	0.5	888	653	3420	0.5	1100	749
4x-4y	25	2880	0.7	569	407	3480	0.7	711	471	2720	0.7	532	391	3260	0.7	662	449
	40	2370	0.9	189	135	2730	0.9	237	157	2230	0.9	177	130	2550	0.9	220	149
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		804	804	7.20	7.20	804	804	7.20	7.20	744	744	7.20	7.20	744	744	7.20	7.20
3.13 %	0	3460	0.0	1790	1500	4270	0.0	2210	1690	3290	0.0	1680	1450	4030	0.0	2070	1620
Ar(in²)	11	3380	0.2	1610	1350	4140	0.2	1990	1520	3210	0.2	1520	1310	3900	0.2	1860	1460
=18.00	13	3340	0.3	1410	1180	4090	0.3	1740	1330	3170	0.3	1330	1140	3850	0.3	1630	1280
	17	3260	0.4	1210	1010	3960	0.4	1490	1140	3090	0.4	1140	979	3730	0.4	1390	1090
8-#14	21	3150	0.5	1010	842	3800	0.5	1240	948	2990	0.5	947	816	3580	0.5	1160	912
2x-4y	25	3030	0.7	604	505	3630	0.7	746	569	2870	0.7	568	489	3410	0.7	697	547
	40	2470	0.9	201	168	2810	0.9	248	189	2320	0.9	189	163	2630	0.9	232	182
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		802	802	7.20	7.20	802	802	7.20	7.20	743	743	7.20	7.20	743	743	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 24

Designation		W 12 x190								W 12 x170							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.55 %	0	2610	0.0	1150	814	3280	0.0	1490	967	2440	0.0	1040	768	3040	0.0	1350	906
Ar(in²)	11	2550	0.2	1030	732	3180	0.2	1340	870	2390	0.2	939	691	2950	0.2	1220	815
= 3.16	13	2530	0.3	904	641	3150	0.3	1180	762	2360	0.3	822	605	2920	0.3	1070	713
	17	2470	0.4	774	549	3060	0.4	1010	653	2310	0.4	704	518	2840	0.4	912	611
4-# 8	21	2400	0.5	645	457	2950	0.5	840	544	2240	0.5	587	432	2730	0.5	760	509
2x-2y	25	2320	0.7	387	274	2830	0.7	504	326	2170	0.7	352	259	2620	0.7	456	305
	40	1930	0.9	129	91	2250	0.9	168	108	1800	0.9	117	86	2070	0.9	152	101
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		686	686	7.20	7.20	686	686	7.20	7.20	627	627	7.20	7.20	627	627	7.20	7.20
1.08 %	0	2720	0.0	1270	935	3380	0.0	1620	1090	2550	0.0	1170	890	3140	0.0	1480	1030
Ar(in²)	11	2650	0.2	1140	842	3280	0.2	1460	980	2490	0.2	1050	801	3050	0.2	1330	925
= 6.24	13	2630	0.3	1000	736	3240	0.3	1270	857	2460	0.3	919	701	3010	0.3	1160	809
	17	2570	0.4	857	631	3150	0.4	1090	735	2400	0.4	787	600	2930	0.4	995	694
4-#11	21	2490	0.5	714	526	3040	0.5	909	612	2330	0.5	656	500	2820	0.5	829	578
2x-2y	25	2400	0.7	428	315	2900	0.7	545	367	2250	0.7	393	300	2690	0.7	497	347
	40	1990	0.9	142	105	2290	0.9	181	122	1850	0.9	131	100	2120	0.9	165	115
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		685	685	7.20	7.20	685	685	7.20	7.20	626	626	7.20	7.20	626	626	7.20	7.20
2.08 %	0	2910	0.0	1470	1120	3580	0.0	1820	1270	2740	0.0	1370	1070	3340	0.0	1680	1210
Ar(in²)	11	2840	0.2	1330	1000	3470	0.2	1640	1140	2670	0.2	1230	963	3240	0.2	1510	1090
=12.00	13	2810	0.3	1160	879	3430	0.3	1430	1000	2650	0.3	1080	843	3190	0.3	1320	951
	17	2740	0.4	994	753	3320	0.4	1230	857	2580	0.4	924	722	3100	0.4	1130	815
12-# 9	21	2660	0.5	828	628	3190	0.5	1020	714	2500	0.5	770	602	2970	0.5	943	679
4x-4y	25	2560	0.7	497	376	3050	0.7	613	428	2400	0.7	462	361	2830	0.7	566	407
	40	2080	0.9	165	125	2370	0.9	204	142	1940	0.9	154	120	2190	0.9	188	135
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		684	684	7.20	7.20	684	684	7.20	7.20	625	625	7.20	7.20	625	625	7.20	7.20
3.13 %	0	3120	0.0	1750	1240	3780	0.0	2090	1390	2950	0.0	1640	1190	3540	0.0	1950	1330
Ar(in²)	11	3030	0.2	1570	1120	3660	0.2	1880	1250	2870	0.2	1480	1070	3430	0.2	1760	1200
=18.00	13	3000	0.3	1380	975	3610	0.3	1650	1100	2840	0.3	1290	940	3380	0.3	1540	1050
	17	2920	0.4	1180	836	3500	0.4	1410	939	2760	0.4	1110	805	3270	0.4	1320	898
8-#14	21	2820	0.5	982	696	3350	0.5	1180	783	2660	0.5	924	671	3130	0.5	1100	748
4x-2y	25	2710	0.7	589	418	3190	0.7	705	469	2550	0.7	554	402	2980	0.7	658	449
	40	2180	0.9	196	139	2440	0.9	235	156	2030	0.9	184	134	2270	0.9	219	149
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		682	682	7.20	7.20	682	682	7.20	7.20	624	624	7.20	7.20	624	624	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 24 x 24

Designation		W 12 x152								W 12 x136							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.55 %	0	2290	0.0	951	726	2820	0.0	1230	852	2150	0.0	866	687	2620	0.0	1110	802
Ar(in²)	11	2230	0.2	856	653	2740	0.2	1100	767	2100	0.2	780	618	2550	0.2	1000	722
= 3.16	13	2210	0.3	749	572	2710	0.3	965	671	2080	0.3	682	541	2520	0.3	875	631
	17	2160	0.4	642	490	2630	0.4	827	575	2030	0.4	585	464	2440	0.4	750	541
4-# 8	21	2100	0.5	535	408	2540	0.5	689	479	1970	0.5	487	386	2350	0.5	625	451
2x-2y	25	2020	0.7	321	245	2420	0.7	413	287	1900	0.7	292	232	2250	0.7	375	270
	40	1670	0.9	107	81	1920	0.9	137	95	1560	0.9	97	77	1770	0.9	125	90
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		574	574	7.20	7.20	574	574	7.20	7.20	525	525	7.20	7.20	525	525	7.20	7.20
1.08 %	0	2390	0.0	1070	848	2930	0.0	1350	973	2250	0.0	989	809	2730	0.0	1240	924
Ar(in²)	11	2340	0.2	966	763	2840	0.2	1210	876	2200	0.2	890	728	2650	0.2	1110	831
= 6.24	13	2310	0.3	846	668	2800	0.3	1060	767	2180	0.3	779	637	2610	0.3	972	727
	17	2260	0.4	725	572	2720	0.4	910	657	2120	0.4	668	546	2530	0.4	833	623
4-#11	21	2190	0.5	604	477	2620	0.5	759	547	2050	0.5	556	455	2440	0.5	694	519
2x-2y	25	2110	0.7	362	286	2500	0.7	455	328	1980	0.7	334	273	2330	0.7	416	311
	40	1720	0.9	120	95	1960	0.9	151	109	1610	0.9	111	91	1810	0.9	138	103
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		573	573	7.20	7.20	573	573	7.20	7.20	524	524	7.20	7.20	524	524	7.20	7.20
2.08 %	0	2590	0.0	1280	1030	3120	0.0	1550	1150	2450	0.0	1190	990	2930	0.0	1440	1100
Ar(in²)	11	2520	0.2	1150	926	3020	0.2	1400	1040	2380	0.2	1070	891	2830	0.2	1290	994
=12.00	13	2490	0.3	1010	810	2980	0.3	1220	909	2360	0.3	939	780	2790	0.3	1130	870
	17	2430	0.4	862	694	2890	0.4	1050	779	2290	0.4	805	668	2700	0.4	970	745
12-# 9	21	2350	0.5	718	579	2770	0.5	873	649	2210	0.5	671	557	2590	0.5	808	621
4x-4y	25	2250	0.7	431	347	2640	0.7	523	389	2120	0.7	402	334	2460	0.7	485	372
	40	1810	0.9	143	115	2030	0.9	174	129	1700	0.9	134	111	1880	0.9	161	124
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		572	572	7.20	7.20	572	572	7.20	7.20	523	523	7.20	7.20	523	523	7.20	7.20
3.13 %	0	2800	0.0	1550	1150	3330	0.0	1820	1280	2660	0.0	1470	1110	3130	0.0	1710	1230
Ar(in²)	11	2720	0.2	1400	1040	3210	0.2	1640	1150	2580	0.2	1320	1000	3020	0.2	1540	1100
=18.00	13	2680	0.3	1220	907	3170	0.3	1440	1010	2550	0.3	1150	877	2980	0.3	1350	966
	17	2610	0.4	1050	777	3060	0.4	1230	861	2470	0.4	989	751	2880	0.4	1150	828
8-#14	21	2510	0.5	872	648	2930	0.5	1030	718	2380	0.5	824	626	2750	0.5	962	690
4x-2y	25	2400	0.7	523	388	2780	0.7	615	430	2270	0.7	494	375	2600	0.7	577	414
	40	1900	0.9	174	129	2100	0.9	205	143	1780	0.9	164	125	1950	0.9	192	138
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		570	570	7.20	7.20	570	570	7.20	7.20	522	522	7.20	7.20	522	522	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 24

Designation		W 12 x120								W 12 x106							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.55 %	0	2020	0.0	786	648	2440	0.0	1000	753	1900	0.0	717	613	2270	0.0	907	710
Ar(in²)	11	1970	0.2	708	583	2360	0.2	902	677	1850	0.2	645	552	2200	0.2	816	639
= 3.16	13	1950	0.3	619	510	2330	0.3	789	593	1830	0.3	565	483	2170	0.3	714	559
	17	1900	0.4	531	437	2270	0.4	677	508	1780	0.4	484	414	2110	0.4	612	479
4-# 8	21	1840	0.5	442	364	2180	0.5	564	423	1730	0.5	403	345	2030	0.5	510	399
2x-2y	25	1770	0.7	265	218	2080	0.7	338	254	1660	0.7	242	207	1930	0.7	306	239
	40	1450	0.9	88	72	1630	0.9	112	84	1350	0.9	80	69	1510	0.9	102	79
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		479	479	7.20	7.20	479	479	7.20	7.20	437	437	7.20	7.20	437	437	7.20	7.20
1.08 %	0	2120	0.0	910	770	2540	0.0	1130	875	2000	0.0	840	735	2370	0.0	1030	832
Ar(in²)	11	2070	0.2	819	693	2460	0.2	1010	787	1950	0.2	756	662	2300	0.2	927	749
= 6.24	13	2040	0.3	716	606	2430	0.3	886	689	1930	0.3	662	579	2270	0.3	811	655
	17	1990	0.4	614	520	2360	0.4	760	590	1880	0.4	567	496	2200	0.4	695	561
4-#11	21	1930	0.5	511	433	2260	0.5	633	492	1810	0.5	472	413	2110	0.5	579	468
2x-2y	25	1850	0.7	307	260	2160	0.7	380	295	1740	0.7	283	248	2010	0.7	347	280
	40	1500	0.9	102	86	1670	0.9	126	98	1400	0.9	94	82	1550	0.9	115	93
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		478	478	7.20	7.20	478	478	7.20	7.20	437	437	7.20	7.20	437	437	7.20	7.20
2.08 %	0	2320	0.0	1110	952	2740	0.0	1330	1060	2200	0.0	1040	917	2570	0.0	1230	1010
Ar(in²)	11	2250	0.2	1000	856	2650	0.2	1200	950	2130	0.2	939	825	2480	0.2	1110	911
=12.00	13	2230	0.3	876	749	2610	0.3	1050	831	2110	0.3	822	722	2450	0.3	971	797
	17	2160	0.4	751	642	2520	0.4	897	712	2050	0.4	704	619	2360	0.4	833	683
12-# 9	21	2090	0.5	626	535	2420	0.5	747	593	1970	0.5	587	515	2260	0.5	694	569
4x-4y	25	2000	0.7	375	321	2290	0.7	448	356	1880	0.7	352	309	2140	0.7	416	341
	40	1580	0.9	125	107	1740	0.9	149	118	1480	0.9	117	103	1620	0.9	138	113
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		477	477	7.20	7.20	477	477	7.20	7.20	435	435	7.20	7.20	435	435	7.20	7.20
3.13 %	0	2520	0.0	1390	1080	2940	0.0	1600	1180	2400	0.0	1320	1040	2770	0.0	1510	1140
Ar(in²)	11	2440	0.2	1250	967	2840	0.2	1440	1060	2330	0.2	1190	936	2670	0.2	1360	1020
=18.00	13	2410	0.3	1090	846	2800	0.3	1260	928	2300	0.3	1040	819	2630	0.3	1190	894
	17	2340	0.4	935	725	2690	0.4	1080	795	2220	0.4	889	702	2530	0.4	1020	766
8-#14	21	2250	0.5	779	604	2570	0.5	901	663	2130	0.5	740	585	2420	0.5	847	639
4x-2y	25	2140	0.7	467	362	2430	0.7	540	397	2030	0.7	444	351	2280	0.7	508	383
	40	1660	0.9	155	120	1810	0.9	180	132	1550	0.9	148	117	1680	0.9	169	127
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		476	476	7.20	7.20	476	476	7.20	7.20	434	434	7.20	7.20	434	434	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85　f'c : 3.0 ksi NW
φb = 0.90　Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)　　Column Size(b x h): 24 x 24

Designation		W 12 x 96								W 12 x 87							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.55 %	0	1810	0.0	667	586	2140	0.0	838	677	1730	0.0	623	561	2040	0.0	778	647
Ar(in²)	11	1760	0.2	601	528	2080	0.2	755	610	1690	0.2	561	505	1970	0.2	700	582
= 3.16	13	1740	0.3	526	462	2050	0.3	660	533	1670	0.3	491	442	1950	0.3	612	509
	17	1700	0.4	450	396	1990	0.4	566	457	1620	0.4	421	379	1890	0.4	525	436
4-# 8	21	1640	0.5	375	330	1910	0.5	471	381	1570	0.5	350	316	1810	0.5	437	364
2x-2y	25	1580	0.7	225	198	1820	0.7	283	228	1510	0.7	210	189	1730	0.7	262	218
	40	1280	0.9	75	66	1420	0.9	94	76	1210	0.9	70	63	1340	0.9	87	72
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		407	407	7.20	7.20	407	407	7.20	7.20	381	381	7.20	7.20	381	381	7.20	7.20
1.08 %	0	1910	0.0	791	709	2250	0.0	962	799	1840	0.0	747	684	2140	0.0	901	769
Ar(in²)	11	1860	0.2	711	638	2180	0.2	865	719	1790	0.2	672	615	2070	0.2	811	692
= 6.24	13	1840	0.3	622	558	2150	0.3	757	629	1770	0.3	588	538	2050	0.3	709	605
	17	1790	0.4	533	478	2080	0.4	649	539	1720	0.4	504	461	1980	0.4	608	519
4-#11	21	1730	0.5	444	398	2000	0.5	541	449	1660	0.5	420	384	1900	0.5	506	432
2x-2y	25	1660	0.7	266	239	1900	0.7	324	269	1580	0.7	252	230	1800	0.7	304	259
	40	1320	0.9	88	79	1460	0.9	108	89	1260	0.9	84	76	1380	0.9	101	86
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		406	406	7.20	7.20	406	406	7.20	7.20	380	380	7.20	7.20	380	380	7.20	7.20
2.08 %	0	2110	0.0	994	890	2450	0.0	1170	980	2040	0.0	950	866	2340	0.0	1100	950
Ar(in²)	11	2050	0.2	895	801	2360	0.2	1050	882	1970	0.2	855	779	2260	0.2	993	855
=12.00	13	2020	0.3	783	701	2330	0.3	917	772	1950	0.3	748	682	2220	0.3	869	748
	17	1960	0.4	671	601	2250	0.4	786	662	1890	0.4	641	584	2140	0.4	745	641
12-# 9	21	1890	0.5	559	501	2150	0.5	655	551	1810	0.5	534	487	2050	0.5	621	534
4x-4y	25	1800	0.7	335	300	2030	0.7	393	331	1730	0.7	320	292	1940	0.7	372	320
	40	1400	0.9	111	100	1520	0.9	131	110	1330	0.9	106	97	1440	0.9	124	106
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		405	405	7.20	7.20	405	405	7.20	7.20	379	379	7.20	7.20	379	379	7.20	7.20
3.13 %	0	2320	0.0	1270	1010	2650	0.0	1440	1100	2240	0.0	1220	989	2550	0.0	1380	1070
Ar(in²)	11	2240	0.2	1140	912	2550	0.2	1290	993	2160	0.2	1100	890	2450	0.2	1240	966
=18.00	13	2210	0.3	998	798	2510	0.3	1130	869	2130	0.3	963	779	2410	0.3	1080	845
	17	2130	0.4	855	684	2420	0.4	971	745	2060	0.4	825	668	2310	0.4	929	724
8-#14	21	2050	0.5	713	570	2300	0.5	809	621	1970	0.5	688	556	2200	0.5	774	604
4x-2y	25	1940	0.7	427	342	2170	0.7	485	372	1870	0.7	412	334	2070	0.7	464	362
	40	1480	0.9	142	114	1580	0.9	161	124	1400	0.9	137	111	1500	0.9	154	120
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		404	404	7.20	7.20	404	404	7.20	7.20	378	378	7.20	7.20	378	378	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 24 x 24

Designation		W 12 x 79								W							
Fy (ksi)		36				50											
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy								
.55 %	0	1660	0.0	584	538	1940	0.0	723	619								
Ar(in^2)	11	1620	0.2	526	484	1880	0.2	651	557								
= 3.16	13	1600	0.3	460	424	1850	0.3	570	487								
	17	1560	0.4	394	363	1800	0.4	488	418								
4-# 8	21	1500	0.5	328	302	1720	0.5	407	348								
2x-2y	25	1440	0.7	197	181	1640	0.7	244	209								
	40	1150	0.9	65	60	1260	0.9	81	69								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		357	357	7.20	7.20	357	357	7.20	7.20								
1.08 %	0	1770	0.0	708	661	2050	0.0	847	741								
Ar(in^2)	11	1720	0.2	637	594	1980	0.2	762	667								
= 6.24	13	1700	0.3	557	520	1950	0.3	667	583								
	17	1650	0.4	477	446	1880	0.4	571	500								
4-#11	21	1590	0.5	398	371	1810	0.5	476	417								
2x-2y	25	1520	0.7	238	223	1710	0.7	285	250								
	40	1200	0.9	79	74	1300	0.9	95	83								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		356	356	7.20	7.20	356	356	7.20	7.20								
2.08 %	0	1970	0.0	911	842	2240	0.0	1050	923								
Ar(in^2)	11	1900	0.2	820	758	2160	0.2	945	830								
=12.00	13	1880	0.3	717	663	2130	0.3	827	726								
	17	1820	0.4	615	568	2050	0.4	708	623								
12-# 9	21	1740	0.5	512	474	1950	0.5	590	519								
4x-4y	25	1660	0.7	307	284	1850	0.7	354	311								
	40	1270	0.9	102	94	1360	0.9	118	103								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		355	355	7.20	7.20	355	355	7.20	7.20								
3.13 %	0	2170	0.0	1180	966	2450	0.0	1320	1050								
Ar(in^2)	11	2090	0.2	1070	870	2350	0.2	1190	941								
=18.00	13	2060	0.3	932	761	2310	0.3	1040	823								
	17	1990	0.4	799	652	2220	0.4	893	706								
8-#14	21	1900	0.5	666	543	2110	0.5	744	588								
4x-2y	25	1800	0.7	399	326	1980	0.7	446	353								
	40	1340	0.9	133	108	1420	0.9	148	117								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		353	353	7.20	7.20	353	353	7.20	7.20								
.00 %	0	0	0.0	0	0	0	0.0	0	0								
Ar(in^2)	11	0	0.2	0	0	0	0.2	0	0								
= .00	13	0	0.3	0	0	0	0.3	0	0								
	17	0	0.4	0	0	0	0.4	0	0								
0-# 0	21	0	0.5	0	0	0	0.5	0	0								
0x-0y	25	0	0.7	0	0	0	0.7	0	0								
	40	0	0.9	0	0	0	0.9	0	0								
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00								

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 24 x 24

Designation		W 10 x112								W 10 x100							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.55 %	0	1950	0.0	697	603	2340	0.0	868	691	1840	0.0	645	576	2190	0.0	796	657
Ar(in²)	11	1900	0.2	627	543	2270	0.2	781	622	1800	0.2	581	518	2130	0.2	717	591
= 3.16	13	1880	0.3	549	475	2240	0.3	683	544	1780	0.3	508	453	2100	0.3	627	517
	17	1830	0.4	470	407	2170	0.4	585	466	1730	0.4	435	388	2040	0.4	537	443
4-# 8	21	1770	0.5	392	339	2090	0.5	488	388	1680	0.5	363	324	1960	0.5	448	369
2x-2y	25	1710	0.7	235	203	2000	0.7	292	233	1610	0.7	217	194	1870	0.7	268	221
	40	1390	0.9	78	67	1560	0.9	97	77	1300	0.9	72	64	1450	0.9	89	73
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		455	455	7.20	7.20	455	455	7.20	7.20	419	419	7.20	7.20	419	419	7.20	7.20
1.08 %	0	2050	0.0	820	725	2440	0.0	990	813	1950	0.0	768	698	2300	0.0	919	779
Ar(in²)	11	2000	0.2	738	653	2370	0.2	891	731	1900	0.2	691	628	2230	0.2	827	701
= 6.24	13	1980	0.3	645	571	2340	0.3	780	640	1880	0.3	605	550	2200	0.3	724	613
	17	1920	0.4	553	489	2260	0.4	668	548	1820	0.4	518	471	2130	0.4	620	525
4-#11	21	1860	0.5	461	408	2170	0.5	557	457	1760	0.5	432	392	2040	0.5	517	438
2x-2y	25	1780	0.7	276	244	2070	0.7	334	274	1690	0.7	259	235	1940	0.7	310	262
	40	1440	0.9	92	81	1600	0.9	111	91	1350	0.9	86	78	1490	0.9	103	87
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		454	454	7.20	7.20	454	454	7.20	7.20	419	419	7.20	7.20	419	419	7.20	7.20
2.08 %	0	2250	0.0	1020	907	2640	0.0	1190	994	2150	0.0	971	879	2500	0.0	1120	960
Ar(in²)	11	2180	0.2	920	816	2550	0.2	1070	894	2080	0.2	874	791	2410	0.2	1010	864
=12.00	13	2160	0.3	805	714	2510	0.3	939	782	2060	0.3	764	692	2370	0.3	883	756
	17	2090	0.4	690	612	2430	0.4	805	671	1990	0.4	655	593	2290	0.4	757	648
12-# 9	21	2020	0.5	575	510	2330	0.5	671	559	1920	0.5	546	494	2190	0.5	631	540
4x-4y	25	1930	0.7	345	306	2210	0.7	402	335	1830	0.7	327	296	2080	0.7	378	324
	40	1520	0.9	115	102	1670	0.9	134	111	1430	0.9	109	98	1560	0.9	126	108
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		453	453	7.20	7.20	453	453	7.20	7.20	417	417	7.20	7.20	417	417	7.20	7.20
3.13 %	0	2450	0.0	1300	1030	2840	0.0	1470	1120	2350	0.0	1240	1000	2700	0.0	1390	1080
Ar(in²)	11	2370	0.2	1170	927	2740	0.2	1320	1010	2270	0.2	1120	902	2600	0.2	1260	974
=18.00	13	2340	0.3	1020	811	2700	0.3	1150	879	2240	0.3	979	790	2560	0.3	1100	853
	17	2270	0.4	874	695	2600	0.4	989	753	2170	0.4	839	677	2460	0.4	941	731
8-#14	21	2180	0.5	728	579	2480	0.5	824	628	2080	0.5	699	564	2350	0.5	784	609
4x-2y	25	2080	0.7	437	347	2340	0.7	494	376	1980	0.7	419	338	2210	0.7	470	365
	40	1600	0.9	145	115	1730	0.9	164	125	1510	0.9	139	112	1620	0.9	156	121
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		451	451	7.20	7.20	451	451	7.20	7.20	416	416	7.20	7.20	416	416	7.20	7.20
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕ_c = 0.85   f'c : 3.0 ksi NW
ϕ_b = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 24 x 24

Designation		W 10 x 88								W							
Fy (ksi)		36				50											
Reinf.	KL	$\phi_c P_n$	$P_u/(\phi_c P_n)$	Mux	Muy	$\phi_c P_n$	$P_u/(\phi_c P_n)$	Mux	Muy								
.55 %	0	1740	0.0	595	547	2050	0.0	727	622								
Ar(in²)	11	1700	0.2	535	492	1990	0.2	654	560								
= 3.16	13	1680	0.3	468	431	1960	0.3	572	490								
	17	1630	0.4	401	369	1900	0.4	490	420								
4-# 8	21	1580	0.5	334	308	1830	0.5	409	350								
2x-2y	25	1520	0.7	200	184	1740	0.7	245	210								
	40	1220	0.9	66	61	1350	0.9	81	70								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		384	384	7.20	7.20	384	384	7.20	7.20								
1.08 %	0	1850	0.0	718	669	2160	0.0	850	744								
Ar(in²)	11	1800	0.2	646	602	2080	0.2	765	670								
= 6.24	13	1770	0.3	565	527	2060	0.3	669	586								
	17	1730	0.4	484	452	1990	0.4	573	502								
4-#11	21	1660	0.5	403	376	1910	0.5	478	418								
2x-2y	25	1590	0.7	242	226	1810	0.7	286	251								
	40	1260	0.9	80	75	1380	0.9	95	83								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		383	383	7.20	7.20	383	383	7.20	7.20								
2.08 %	0	2040	0.0	921	851	2350	0.0	1050	925								
Ar(in²)	11	1980	0.2	828	766	2270	0.2	947	833								
=12.00	13	1960	0.3	725	670	2240	0.3	829	729								
	17	1890	0.4	621	574	2160	0.4	710	625								
12-# 9	21	1820	0.5	518	479	2060	0.5	592	520								
4x-4y	25	1730	0.7	310	287	1950	0.7	355	312								
	40	1340	0.9	103	95	1450	0.9	118	104								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 15 in		382	382	7.20	7.20	382	382	7.20	7.20								
3.13 %	0	2250	0.0	1190	975	2560	0.0	1330	1050								
Ar(in²)	11	2170	0.2	1070	877	2460	0.2	1190	944								
=18.00	13	2140	0.3	940	767	2420	0.3	1040	826								
	17	2070	0.4	805	658	2320	0.4	894	708								
8-#14	21	1980	0.5	671	548	2210	0.5	745	590								
4x-2y	25	1880	0.7	402	329	2080	0.7	447	354								
	40	1410	0.9	134	109	1510	0.9	149	118								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 16 in		381	381	7.20	7.20	381	381	7.20	7.20								
.00 %	0	0	0.0	0	0	0	0.0	0	0								
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0								
= .00	13	0	0.3	0	0	0	0.3	0	0								
	17	0	0.4	0	0	0	0.4	0	0								
0-# 0	21	0	0.5	0	0	0	0.5	0	0								
0x-0y	25	0	0.7	0	0	0	0.7	0	0								
	40	0	0.9	0	0	0	0.9	0	0								
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00								

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for $\phi_c P_n$, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕ_bMnx and Muy = ϕ_bMny when $P_u/(\phi_c P_n)$ = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 24

Designation		W 14 x145								W 14 x132							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.50 %	0	2060	0.0	931	637	2570	0.0	1220	782	1940	0.0	859	584	2410	0.0	1120	711
Ar(in^2)	11	1990	0.2	838	573	2460	0.2	1100	704	1880	0.2	773	526	2310	0.2	1010	640
= 2.40	13	1960	0.3	733	501	2420	0.3	962	616	1850	0.3	676	460	2270	0.3	883	560
	17	1900	0.4	629	430	2320	0.4	824	528	1790	0.4	580	394	2180	0.4	757	480
4-# 7	21	1820	0.5	524	358	2210	0.5	687	440	1720	0.5	483	328	2070	0.5	631	400
2x-2y	25	1730	0.7	314	215	2070	0.7	412	264	1630	0.7	290	197	1940	0.7	378	240
	40	1330	0.9	104	71	1490	0.9	137	88	1240	0.9	96	65	1380	0.9	126	80
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		533	370	7.20	6.00	533	370	7.20	6.00	494	343	7.20	6.00	494	343	7.20	6.00
1.00 %	0	2140	0.0	1040	684	2650	0.0	1330	829	2030	0.0	962	631	2490	0.0	1230	758
Ar(in^2)	11	2070	0.2	932	615	2540	0.2	1190	746	1960	0.2	866	568	2380	0.2	1100	682
= 4.80	13	2040	0.3	815	538	2490	0.3	1040	653	1930	0.3	758	497	2340	0.3	965	597
	17	1970	0.4	699	461	2390	0.4	894	559	1860	0.4	650	426	2240	0.4	827	511
8-# 7	21	1890	0.5	582	384	2270	0.5	745	466	1780	0.5	541	355	2130	0.5	689	426
4x-2y	25	1790	0.7	349	230	2120	0.7	447	279	1690	0.7	325	213	1990	0.7	413	255
	40	1360	0.9	116	76	1510	0.9	149	93	1270	0.9	108	71	1400	0.9	137	85
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		532	370	7.20	6.00	532	370	7.20	6.00	493	342	7.20	6.00	493	342	7.20	6.00
2.12 %	0	2320	0.0	1260	792	2830	0.0	1550	937	2210	0.0	1190	740	2670	0.0	1450	866
Ar(in^2)	11	2240	0.2	1130	713	2700	0.2	1390	843	2130	0.2	1070	666	2550	0.2	1300	779
=10.16	13	2200	0.3	990	624	2660	0.3	1220	738	2090	0.3	933	582	2500	0.3	1140	682
	17	2120	0.4	849	534	2540	0.4	1040	632	2020	0.4	800	499	2390	0.4	977	584
8-#10	21	2030	0.5	707	445	2400	0.5	870	527	1920	0.5	666	416	2250	0.5	814	487
4x-2y	25	1910	0.7	424	267	2240	0.7	522	316	1810	0.7	400	249	2100	0.7	488	292
	40	1420	0.9	141	89	1550	0.9	174	105	1330	0.9	133	83	1440	0.9	162	97
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		531	369	7.20	6.00	531	369	7.20	6.00	492	341	7.20	6.00	492	341	7.20	6.00
2.60 %	0	2400	0.0	1350	861	2910	0.0	1630	1010	2290	0.0	1270	808	2750	0.0	1540	934
Ar(in^2)	11	2310	0.2	1210	774	2780	0.2	1470	905	2200	0.2	1150	727	2620	0.2	1380	841
=12.48	13	2280	0.3	1060	678	2730	0.3	1290	792	2160	0.3	1000	636	2570	0.3	1210	736
	17	2190	0.4	908	581	2600	0.4	1100	678	2080	0.4	859	545	2450	0.4	1040	630
8-#11	21	2090	0.5	756	484	2450	0.5	919	565	1980	0.5	716	454	2310	0.5	863	525
4x-2y	25	1970	0.7	454	290	2280	0.7	551	339	1860	0.7	429	272	2150	0.7	518	315
	40	1440	0.9	151	96	1560	0.9	183	113	1350	0.9	143	90	1460	0.9	172	105
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		531	368	7.20	6.00	531	368	7.20	6.00	491	341	7.20	6.00	491	341	7.20	6.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in^2)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 20 x 24

Designation		W 14 x120								W 14 x109							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.50 %	0	1840	0.0	794	553	2260	0.0	1030	670	1750	0.0	733	523	2130	0.0	952	632
Ar(in²)	11	1780	0.2	715	497	2170	0.2	931	603	1690	0.2	660	471	2040	0.2	856	569
= 2.40	13	1760	0.3	625	435	2130	0.3	814	528	1660	0.3	577	412	2000	0.3	749	498
	17	1700	0.4	536	373	2050	0.4	698	452	1610	0.4	495	353	1920	0.4	642	427
4-# 7	21	1630	0.5	447	311	1940	0.5	581	377	1540	0.5	412	294	1820	0.5	535	356
2x-2y	25	1540	0.7	268	186	1820	0.7	349	226	1460	0.7	247	176	1700	0.7	321	213
	40	1170	0.9	89	62	1290	0.9	116	75	1100	0.9	82	58	1210	0.9	107	71
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		458	318	7.20	6.00	458	318	7.20	6.00	425	295	7.20	6.00	425	295	7.20	6.00
1.00 %	0	1920	0.0	898	600	2340	0.0	1140	717	1830	0.0	837	570	2210	0.0	1060	680
Ar(in²)	11	1860	0.2	808	540	2240	0.2	1020	646	1760	0.2	753	513	2110	0.2	950	612
= 4.80	13	1830	0.3	707	472	2210	0.3	896	565	1740	0.3	659	449	2080	0.3	831	535
	17	1770	0.4	606	405	2110	0.4	768	484	1670	0.4	565	385	1990	0.4	712	459
8-# 7	21	1690	0.5	505	337	2000	0.5	640	403	1600	0.5	471	321	1880	0.5	593	382
4x-2y	25	1600	0.7	303	202	1870	0.7	384	242	1510	0.7	282	192	1750	0.7	356	229
	40	1200	0.9	101	67	1310	0.9	128	80	1120	0.9	94	64	1220	0.9	118	76
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		458	318	7.20	6.00	458	318	7.20	6.00	424	295	7.20	6.00	424	295	7.20	6.00
1.88 %	0	2070	0.0	1060	756	2490	0.0	1300	873	1970	0.0	998	726	2350	0.0	1220	835
Ar(in²)	11	1990	0.2	953	680	2370	0.2	1170	786	1900	0.2	898	654	2240	0.2	1090	752
= 9.00	13	1960	0.3	833	595	2330	0.3	1020	687	1870	0.3	785	572	2200	0.3	957	658
	17	1890	0.4	714	510	2230	0.4	876	589	1790	0.4	673	490	2100	0.4	820	564
4-#14	21	1800	0.5	595	425	2100	0.5	730	491	1710	0.5	561	408	1980	0.5	683	470
2x-2y	25	1690	0.7	357	255	1960	0.7	438	294	1600	0.7	336	245	1840	0.7	410	282
	40	1240	0.9	119	85	1340	0.9	146	98	1160	0.9	112	81	1250	0.9	136	94
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		457	317	7.20	6.00	457	317	7.20	6.00	424	294	7.20	6.00	424	294	7.20	6.00
2.60 %	0	2190	0.0	1210	777	2610	0.0	1450	894	2090	0.0	1150	748	2470	0.0	1370	856
Ar(in²)	11	2100	0.2	1090	699	2480	0.2	1300	804	2000	0.2	1030	673	2350	0.2	1230	771
=12.48	13	2070	0.3	952	612	2430	0.3	1140	704	1970	0.3	904	589	2300	0.3	1080	674
	17	1980	0.4	816	524	2320	0.4	977	603	1890	0.4	775	504	2190	0.4	921	578
8-#11	21	1880	0.5	680	437	2180	0.5	814	503	1790	0.5	645	420	2060	0.5	768	481
4x-2y	25	1770	0.7	408	262	2020	0.7	488	301	1680	0.7	387	252	1910	0.7	460	289
	40	1270	0.9	136	87	1360	0.9	162	100	1190	0.9	129	84	1270	0.9	153	96
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		456	317	7.20	6.00	456	317	7.20	6.00	423	293	7.20	6.00	423	293	7.20	6.00
3.75 %	0	2380	0.0	1430	873	2800	0.0	1670	990	2280	0.0	1370	844	2660	0.0	1580	952
Ar(in²)	11	2270	0.2	1280	786	2650	0.2	1500	891	2180	0.2	1230	759	2520	0.2	1430	857
=18.00	13	2230	0.3	1120	687	2600	0.3	1310	779	2140	0.3	1080	664	2470	0.3	1250	750
	17	2130	0.4	963	589	2470	0.4	1120	668	2040	0.4	922	569	2340	0.4	1070	642
8-#14	21	2020	0.5	802	491	2310	0.5	936	556	1930	0.5	768	474	2180	0.5	890	535
4x-2y	25	1890	0.7	481	294	2130	0.7	562	334	1790	0.7	461	284	2010	0.7	534	321
	40	1310	0.9	160	98	1390	0.9	187	111	1240	0.9	153	94	1300	0.9	178	107
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		455	316	7.20	6.00	455	316	7.20	6.00	422	293	7.20	6.00	422	293	7.20	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 24

Designation		W 14 x 99								W 14 x 90							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.50 %	0	1660	0.0	678	495	2010	0.0	877	596	1590	0.0	629	469	1900	0.0	810	564
Ar(in²)	11	1600	0.2	610	445	1920	0.2	790	537	1530	0.2	566	422	1820	0.2	729	507
= 2.40	13	1580	0.3	534	390	1890	0.3	691	470	1510	0.3	495	369	1790	0.3	638	444
	17	1530	0.4	458	334	1810	0.4	592	402	1450	0.4	424	316	1710	0.4	546	380
4-# 7	21	1460	0.5	381	278	1710	0.5	493	335	1390	0.5	353	263	1620	0.5	455	317
2x-2y	25	1380	0.7	229	167	1600	0.7	296	201	1310	0.7	212	158	1510	0.7	273	190
	40	1030	0.9	76	55	1130	0.9	98	67	975	0.9	70	52	1060	0.9	91	63
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
a 13 in		396	275	7.20	6.00	396	275	7.20	6.00	369	256	7.20	6.00	369	256	7.20	6.00
1.00 %	0	1740	0.0	782	542	2090	0.0	981	644	1670	0.0	733	516	1980	0.0	914	611
Ar(in²)	11	1680	0.2	704	488	2000	0.2	883	579	1610	0.2	659	465	1890	0.2	822	550
= 4.80	13	1650	0.3	616	427	1960	0.3	772	507	1580	0.3	577	406	1860	0.3	719	481
	17	1590	0.4	528	366	1880	0.4	662	434	1520	0.4	494	348	1780	0.4	617	412
8-# 7	21	1520	0.5	440	305	1770	0.5	552	362	1450	0.5	412	290	1680	0.5	514	343
4x-2y	25	1430	0.7	264	183	1650	0.7	331	217	1370	0.7	247	174	1560	0.7	308	206
	40	1060	0.9	88	61	1150	0.9	110	72	999	0.9	82	58	1080	0.9	102	68
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
a 13 in		395	274	7.20	6.00	395	274	7.20	6.00	369	256	7.20	6.00	369	256	7.20	6.00
1.88 %	0	1890	0.0	943	699	2230	0.0	1140	799	1810	0.0	893	673	2130	0.0	1070	767
Ar(in²)	11	1810	0.2	848	629	2130	0.2	1030	719	1740	0.2	804	605	2020	0.2	967	690
= 9.00	13	1780	0.3	742	550	2090	0.3	899	629	1710	0.3	703	530	1990	0.3	846	604
	17	1710	0.4	636	471	1990	0.4	770	539	1640	0.4	603	454	1890	0.4	725	517
4-#14	21	1630	0.5	530	393	1870	0.5	642	449	1550	0.5	502	378	1780	0.5	604	431
2x-2y	25	1530	0.7	318	235	1740	0.7	385	269	1460	0.7	301	227	1650	0.7	362	258
	40	1100	0.9	106	78	1180	0.9	128	89	1040	0.9	100	75	1110	0.9	120	86
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
a 13 in		394	274	7.20	6.00	394	274	7.20	6.00	368	255	7.20	6.00	368	255	7.20	6.00
2.60 %	0	2010	0.0	1090	720	2350	0.0	1290	820	1930	0.0	1040	694	2250	0.0	1220	788
Ar(in²)	11	1920	0.2	984	648	2240	0.2	1160	738	1850	0.2	939	624	2130	0.2	1100	709
=12.48	13	1890	0.3	861	567	2190	0.3	1020	646	1810	0.3	822	546	2090	0.3	964	620
	17	1810	0.4	738	486	2080	0.4	871	554	1730	0.4	704	468	1980	0.4	826	532
8-#11	21	1710	0.5	615	405	1950	0.5	726	461	1640	0.5	587	390	1860	0.5	688	443
4x-2y	25	1600	0.7	369	243	1810	0.7	435	277	1530	0.7	352	234	1710	0.7	413	266
	40	1130	0.9	123	81	1200	0.9	145	92	1060	0.9	117	78	1120	0.9	137	88
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
a 13 in		394	273	7.20	6.00	394	273	7.20	6.00	367	255	7.20	6.00	367	255	7.20	6.00
3.75 %	0	2200	0.0	1310	816	2540	0.0	1510	916	2120	0.0	1260	791	2440	0.0	1440	884
Ar(in²)	11	2090	0.2	1180	734	2400	0.2	1360	825	2020	0.2	1140	712	2300	0.2	1300	795
=18.00	13	2050	0.3	1030	642	2350	0.3	1190	721	1980	0.3	993	623	2250	0.3	1140	696
	17	1960	0.4	885	551	2230	0.4	1020	618	1880	0.4	851	534	2130	0.4	973	596
8-#14	21	1840	0.5	737	459	2080	0.5	849	515	1770	0.5	709	445	1980	0.5	811	497
4x-2y	25	1710	0.7	442	275	1910	0.7	509	309	1640	0.7	425	267	1810	0.7	486	298
	40	1160	0.9	147	91	1220	0.9	169	103	1100	0.9	141	89	1150	0.9	162	99
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
a 13 in		392	272	7.20	6.00	392	272	7.20	6.00	366	254	7.20	6.00	366	254	7.20	6.00

Notes :
1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 20 x 24

Designation		W 14 x 82								W 14 x 74							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.50 %	0	1520	0.0	588	396	1800	0.0	751	456	1450	0.0	546	379	1710	0.0	695	437
Ar(in²)	11	1460	0.2	529	356	1720	0.2	676	410	1400	0.2	491	341	1630	0.2	625	393
= 2.40	13	1440	0.3	463	312	1690	0.3	592	359	1370	0.3	430	299	1600	0.3	547	344
	17	1390	0.4	397	267	1620	0.4	507	308	1320	0.4	368	256	1530	0.4	469	295
4-# 7	21	1320	0.5	331	222	1530	0.5	422	256	1260	0.5	307	213	1450	0.5	391	245
2x-2y	25	1250	0.7	198	133	1430	0.7	253	154	1190	0.7	184	128	1350	0.7	234	147
	40	922	0.9	66	44	998	0.9	84	51	870	0.9	61	42	937	0.9	78	49
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		345	240	7.20	6.00	345	240	7.20	6.00	322	224	7.20	6.00	322	224	7.20	6.00
1.00 %	0	1600	0.0	692	443	1890	0.0	855	503	1530	0.0	650	427	1790	0.0	799	484
Ar(in²)	11	1540	0.2	623	399	1800	0.2	770	453	1470	0.2	585	384	1710	0.2	719	435
= 4.80	13	1510	0.3	545	349	1770	0.3	673	396	1450	0.3	512	336	1680	0.3	629	381
	17	1450	0.4	467	299	1690	0.4	577	339	1390	0.4	438	288	1600	0.4	539	326
8-# 7	21	1380	0.5	389	249	1590	0.5	481	283	1320	0.5	365	240	1510	0.5	449	272
4x-2y	25	1300	0.7	233	149	1480	0.7	288	169	1240	0.7	219	144	1400	0.7	269	163
	40	945	0.9	77	49	1010	0.9	96	56	893	0.9	73	48	953	0.9	89	54
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		345	239	7.20	6.00	345	239	7.20	6.00	322	223	7.20	6.00	322	223	7.20	6.00
1.98 %	0	1760	0.0	857	586	2050	0.0	1020	645	1690	0.0	815	569	1950	0.0	964	626
Ar(in²)	11	1680	0.2	771	527	1940	0.2	918	581	1620	0.2	734	512	1850	0.2	867	563
= 9.48	13	1650	0.3	675	461	1910	0.3	803	508	1590	0.3	642	448	1810	0.3	759	493
	17	1580	0.4	578	395	1810	0.4	688	435	1520	0.4	550	384	1720	0.4	650	422
12-# 8	21	1500	0.5	482	329	1700	0.5	574	363	1430	0.5	458	320	1610	0.5	542	352
4x-4y	25	1400	0.7	289	197	1570	0.7	344	217	1340	0.7	275	192	1490	0.7	325	211
	40	985	0.9	96	65	1040	0.9	114	72	930	0.9	91	64	979	0.9	108	70
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		344	239	7.20	6.00	344	239	7.20	6.00	321	222	7.20	6.00	321	222	7.20	6.00
3.17 %	0	1960	0.0	1060	720	2240	0.0	1220	779	1890	0.0	1020	704	2150	0.0	1170	760
Ar(in²)	11	1860	0.2	953	648	2120	0.2	1100	701	1800	0.2	916	633	2030	0.2	1050	684
=15.24	13	1830	0.3	834	567	2070	0.3	962	614	1760	0.3	801	554	1980	0.3	918	599
	17	1740	0.4	715	486	1960	0.4	825	526	1670	0.4	687	475	1870	0.4	787	513
12-#10	21	1640	0.5	596	405	1830	0.5	687	438	1570	0.5	572	396	1740	0.5	656	427
4x-4y	25	1520	0.7	357	243	1680	0.7	412	263	1450	0.7	343	237	1600	0.7	393	256
	40	1020	0.9	119	81	1070	0.9	137	87	966	0.9	114	79	1000	0.9	131	85
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		343	238	7.20	6.00	343	238	7.20	6.00	319	222	7.20	6.00	319	222	7.20	6.00
3.90 %	0	2070	0.0	1170	822	2360	0.0	1330	881	2010	0.0	1130	806	2270	0.0	1270	862
Ar(in²)	11	1970	0.2	1050	740	2230	0.2	1200	793	1900	0.2	1010	725	2130	0.2	1140	776
=18.72	13	1930	0.3	918	647	2170	0.3	1050	694	1860	0.3	886	635	2080	0.3	1000	679
	17	1830	0.4	787	555	2050	0.4	896	594	1760	0.4	760	544	1960	0.4	858	582
12-#11	21	1720	0.5	656	462	1900	0.5	746	495	1650	0.5	633	453	1820	0.5	715	485
4x-4y	25	1590	0.7	393	277	1740	0.7	448	297	1520	0.7	380	272	1650	0.7	429	291
	40	1040	0.9	131	92	1080	0.9	149	99	983	0.9	126	90	1010	0.9	143	97
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		342	237	7.20	6.00	342	237	7.20	6.00	319	221	7.20	6.00	319	221	7.20	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 20 x 24

Designation		W 14 x 68								W							
Fy (ksi)		36				50											
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy								
.50 %	0	1400	0.0	513	365	1640	0.0	649	420								
Ar(in²)	11	1340	0.2	461	329	1560	0.2	584	378								
= 2.40	13	1320	0.3	403	287	1530	0.3	511	331								
	17	1270	0.4	346	246	1470	0.4	438	283								
4-# 7	21	1210	0.5	288	205	1380	0.5	365	236								
2x-2y	25	1140	0.7	173	123	1290	0.7	219	141								
	40	830	0.9	57	41	889	0.9	73	47								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
a 13 in		304	211	7.20	6.00	304	211	7.20	6.00								
1.00 %	0	1480	0.0	616	413	1720	0.0	753	467								
Ar(in²)	11	1420	0.2	555	371	1640	0.2	677	420								
= 4.80	13	1400	0.3	485	325	1610	0.3	593	368								
	17	1340	0.4	416	278	1530	0.4	508	315								
8-# 7	21	1270	0.5	347	232	1440	0.5	423	263								
4x-2y	25	1190	0.7	208	139	1340	0.7	254	157								
	40	851	0.9	69	46	904	0.9	84	52								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
a 13 in		303	211	7.20	6.00	303	211	7.20	6.00								
1.98 %	0	1640	0.0	782	555	1880	0.0	918	609								
Ar(in²)	11	1570	0.2	704	500	1780	0.2	826	548								
= 9.48	13	1540	0.3	616	437	1740	0.3	723	480								
	17	1470	0.4	528	375	1650	0.4	619	411								
12-# 8	21	1380	0.5	440	312	1550	0.5	516	343								
4x-4y	25	1290	0.7	264	187	1430	0.7	309	205								
	40	887	0.9	88	62	929	0.9	103	68								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
a 13 in		302	210	7.20	6.00	302	210	7.20	6.00								
3.17 %	0	1840	0.0	984	690	2070	0.0	1120	744								
Ar(in²)	11	1740	0.2	886	621	1960	0.2	1010	669								
=15.24	13	1710	0.3	775	544	1910	0.3	882	586								
	17	1620	0.4	664	466	1800	0.4	756	502								
12-#10	21	1520	0.5	553	388	1670	0.5	630	418								
4x-4y	25	1400	0.7	332	233	1530	0.7	378	251								
	40	920	0.9	110	77	950	0.9	126	83								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
a 13 in		301	209	7.20	6.00	301	209	7.20	6.00								
3.90 %	0	1960	0.0	1090	792	2190	0.0	1230	846								
Ar(in²)	11	1850	0.2	984	713	2060	0.2	1100	761								
=18.72	13	1810	0.3	861	624	2010	0.3	965	666								
	17	1710	0.4	738	535	1890	0.4	827	571								
12-#11	21	1600	0.5	615	445	1750	0.5	689	475								
4x-4y	25	1470	0.7	369	267	1590	0.7	413	285								
	40	935	0.9	123	89	959	0.9	137	95								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
a 13 in		300	208	7.20	6.00	300	208	7.20	6.00								

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 24

Designation		W 12 x230								W 12 x210							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.50 %	0	2780	0.0	1300	757	3590	0.0	1720	945	2610	0.0	1200	711	3350	0.0	1580	881
Ar(in²)	11	2700	0.2	1170	681	3450	0.2	1550	851	2530	0.2	1080	640	3220	0.2	1420	793
= 2.40	13	2670	0.3	1030	596	3400	0.3	1360	744	2500	0.3	944	560	3170	0.3	1240	694
	17	2590	0.4	880	511	3270	0.4	1160	638	2430	0.4	809	480	3050	0.4	1060	595
4-# 7	21	2490	0.5	733	426	3110	0.5	969	531	2330	0.5	674	400	2900	0.5	887	495
2x-2y	25	2380	0.7	440	255	2930	0.7	581	319	2230	0.7	404	240	2730	0.7	532	297
	40	1860	0.9	146	85	2140	0.9	193	106	1740	0.9	134	80	1980	0.9	177	99
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		785	545	7.20	6.00	785	545	7.20	6.00	726	504	7.20	6.00	726	504	7.20	6.00
1.00 %	0	2870	0.0	1410	804	3670	0.0	1830	992	2690	0.0	1300	758	3430	0.0	1680	928
Ar(in²)	11	2780	0.2	1270	724	3530	0.2	1640	893	2610	0.2	1170	683	3290	0.2	1510	835
= 4.80	13	2740	0.3	1110	633	3470	0.3	1440	781	2580	0.3	1030	597	3240	0.3	1320	731
	17	2660	0.4	950	543	3340	0.4	1230	669	2500	0.4	878	512	3110	0.4	1130	626
8-# 7	21	2560	0.5	791	452	3170	0.5	1030	558	2400	0.5	732	426	2960	0.5	945	522
4x-2y	25	2440	0.7	475	271	2980	0.7	616	334	2290	0.7	439	256	2780	0.7	567	313
	40	1890	0.9	158	90	2160	0.9	205	111	1770	0.9	146	85	2010	0.9	189	104
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		785	545	7.20	6.00	785	545	7.20	6.00	725	503	7.20	6.00	725	503	7.20	6.00
2.12 %	0	3050	0.0	1630	912	3860	0.0	2050	1100	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	2950	0.2	1470	821	3700	0.2	1840	990	0	0.2	0	0	0	0.2	0	0
=10.16	13	2910	0.3	1280	718	3630	0.3	1610	866	0	0.3	0	0	0	0.3	0	0
	17	2820	0.4	1100	615	3490	0.4	1380	742	0	0.4	0	0	0	0.4	0	0
8-#10	21	2700	0.5	916	513	3310	0.5	1150	618	0	0.5	0	0	0	0.5	0	0
4x-2y	25	2570	0.7	549	307	3100	0.7	690	371	0	0.7	0	0	0	0.7	0	0
	40	1960	0.9	183	102	2210	0.9	230	123	0	0.9	0	0	0	0.9	0	0
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		783	544	7.20	6.00	783	544	7.20	6.00	0	0	.00	.00	0	0	.00	.00
2.60 %	0	3130	0.0	1720	981	3930	0.0	2130	1170	2960	0.0	1610	935	3690	0.0	1990	1100
Ar(in²)	11	3020	0.2	1540	882	3770	0.2	1920	1050	2860	0.2	1450	841	3530	0.2	1790	994
=12.48	13	2980	0.3	1350	772	3700	0.3	1680	920	2820	0.3	1270	736	3470	0.3	1570	869
	17	2880	0.4	1160	662	3550	0.4	1440	788	2720	0.4	1090	631	3330	0.4	1340	745
8-#11	21	2760	0.5	965	551	3360	0.5	1200	657	2600	0.5	906	526	3150	0.5	1120	621
4x-2y	25	2620	0.7	579	331	3150	0.7	720	394	2470	0.7	543	315	2950	0.7	671	372
	40	1990	0.9	193	110	2230	0.9	240	131	1860	0.9	181	105	2070	0.9	223	124
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		783	544	7.20	6.00	783	544	7.20	6.00	723	502	7.20	6.00	723	502	7.20	6.00
3.90 %	0	3340	0.0	1880	1180	4150	0.0	2290	1370	3170	0.0	1770	1140	3910	0.0	2150	1310
Ar(in²)	11	3220	0.2	1690	1060	3960	0.2	2060	1230	3050	0.2	1590	1020	3730	0.2	1930	1170
=18.72	13	3180	0.3	1480	930	3890	0.3	1810	1080	3010	0.3	1400	894	3660	0.3	1690	1030
	17	3060	0.4	1270	797	3720	0.4	1550	924	2900	0.4	1200	766	3500	0.4	1450	881
12-#11	21	2920	0.5	1060	664	3510	0.5	1290	770	2760	0.5	996	638	3300	0.5	1210	734
4x-4y	25	2770	0.7	633	398	3280	0.7	774	462	2610	0.7	597	383	3070	0.7	725	440
	40	2060	0.9	211	132	2270	0.9	258	154	1930	0.9	199	127	2120	0.9	241	146
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		782	543	7.20	6.00	782	543	7.20	6.00	722	501	7.20	6.00	722	501	7.20	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 20 x 24

Designation		W 12 x190								W 12 x170							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	2440	0.0	1100	667	3100	0.0	1440	819	2270	0.0	992	623	2860	0.0	1300	758
Ar(in²)	11	2360	0.2	985	600	2980	0.2	1290	737	2200	0.2	893	561	2750	0.2	1170	682
= 2.40	13	2330	0.3	862	525	2930	0.3	1130	645	2170	0.3	781	491	2710	0.3	1020	597
	17	2260	0.4	739	450	2820	0.4	969	553	2100	0.4	670	420	2600	0.4	875	511
4-# 7	21	2170	0.5	615	375	2680	0.5	807	460	2020	0.5	558	350	2470	0.5	729	426
2x-2y	25	2070	0.7	369	225	2520	0.7	484	276	1920	0.7	335	210	2320	0.7	437	255
	40	1610	0.9	123	75	1830	0.9	161	92	1490	0.9	111	70	1680	0.9	145	85
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		665	462	7.20	6.00	665	462	7.20	6.00	607	421	7.20	6.00	607	421	7.20	6.00
1.00 %	0	2520	0.0	1200	714	3180	0.0	1540	866	2350	0.0	1100	670	2950	0.0	1400	805
Ar(in²)	11	2440	0.2	1080	642	3060	0.2	1390	779	2270	0.2	986	603	2830	0.2	1260	724
= 4.80	13	2410	0.3	943	562	3010	0.3	1210	682	2250	0.3	863	528	2780	0.3	1100	634
	17	2330	0.4	808	482	2890	0.4	1040	584	2170	0.4	739	452	2670	0.4	944	543
8-# 7	21	2240	0.5	674	401	2740	0.5	865	487	2080	0.5	616	377	2530	0.5	787	453
4x-2y	25	2130	0.7	404	241	2580	0.7	519	292	1980	0.7	369	226	2380	0.7	472	271
	40	1640	0.9	134	80	1850	0.9	173	97	1510	0.9	123	75	1700	0.9	157	90
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		665	461	7.20	6.00	665	461	7.20	6.00	606	421	7.20	6.00	606	421	7.20	6.00
1.88 %	0	2660	0.0	1360	869	3330	0.0	1700	1020	2500	0.0	1260	826	3090	0.0	1560	960
Ar(in²)	11	2570	0.2	1220	782	3190	0.2	1530	919	2410	0.2	1130	743	2960	0.2	1400	864
= 9.00	13	2540	0.3	1070	685	3130	0.3	1340	804	2380	0.3	989	650	2910	0.3	1230	756
	17	2450	0.4	916	587	3000	0.4	1150	689	2290	0.4	847	557	2780	0.4	1050	648
4-#14	21	2350	0.5	763	489	2850	0.5	955	574	2190	0.5	706	464	2630	0.5	877	540
2x-2y	25	2230	0.7	458	293	2670	0.7	573	344	2080	0.7	423	278	2460	0.7	526	324
	40	1690	0.9	152	97	1880	0.9	191	114	1560	0.9	141	92	1730	0.9	175	108
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		664	461	7.20	6.00	664	461	7.20	6.00	605	420	7.20	6.00	605	420	7.20	6.00
2.60 %	0	2780	0.0	1510	890	3450	0.0	1850	1040	2610	0.0	1410	846	3210	0.0	1710	981
Ar(in²)	11	2680	0.2	1360	801	3300	0.2	1660	938	2520	0.2	1270	762	3070	0.2	1540	883
=12.48	13	2650	0.3	1190	701	3240	0.3	1460	821	2480	0.3	1110	666	3010	0.3	1350	773
	17	2550	0.4	1020	601	3100	0.4	1250	703	2390	0.4	948	571	2880	0.4	1150	662
8-#11	21	2440	0.5	848	501	2930	0.5	1040	586	2280	0.5	790	476	2720	0.5	961	552
4x-2y	25	2310	0.7	508	300	2740	0.7	623	351	2160	0.7	474	285	2540	0.7	576	331
	40	1730	0.9	169	100	1910	0.9	207	117	1600	0.9	158	95	1760	0.9	192	110
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		663	460	7.20	6.00	663	460	7.20	6.00	604	420	7.20	6.00	604	420	7.20	6.00
3.90 %	0	3000	0.0	1670	1090	3660	0.0	2010	1240	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	2880	0.2	1500	982	3490	0.2	1810	1120	0	0.2	0	0	0	0.2	0	0
=18.72	13	2840	0.3	1310	859	3430	0.3	1580	979	0	0.3	0	0	0	0.3	0	0
	17	2730	0.4	1130	736	3270	0.4	1360	839	0	0.4	0	0	0	0.4	0	0
12-#11	21	2600	0.5	938	613	3080	0.5	1130	699	0	0.5	0	0	0	0.5	0	0
4x-4y	25	2450	0.7	563	368	2860	0.7	677	419	0	0.7	0	0	0	0.7	0	0
	40	1790	0.9	187	122	1950	0.9	225	139	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		662	459	7.20	6.00	662	459	7.20	6.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 20 x 24

Designation		W 12 x152								W 12 x136							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	2120	0.0	901	584	2650	0.0	1170	704	1980	0.0	818	547	2450	0.0	1060	655
Ar(in²)	11	2050	0.2	811	525	2540	0.2	1060	633	1910	0.2	736	492	2350	0.2	953	589
= 2.40	13	2020	0.3	710	460	2500	0.3	923	554	1890	0.3	644	431	2310	0.3	834	516
	17	1960	0.4	608	394	2400	0.4	791	475	1820	0.4	552	369	2220	0.4	715	442
4-# 7	21	1880	0.5	507	328	2280	0.5	659	396	1750	0.5	460	307	2110	0.5	595	368
2x-2y	25	1790	0.7	304	197	2140	0.7	395	237	1660	0.7	276	184	1980	0.7	357	221
	40	1370	0.9	101	65	1540	0.9	131	79	1270	0.9	92	61	1410	0.9	119	73
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		553	384	7.20	6.00	553	384	7.20	6.00	505	350	7.20	6.00	505	350	7.20	6.00
1.00 %	0	2200	0.0	1010	631	2730	0.0	1280	751	2060	0.0	922	594	2530	0.0	1160	702
Ar(in²)	11	2120	0.2	904	568	2620	0.2	1150	676	1990	0.2	830	534	2430	0.2	1050	632
= 4.80	13	2100	0.3	791	497	2570	0.3	1000	591	1960	0.3	726	468	2390	0.3	915	553
	17	2030	0.4	678	426	2470	0.4	861	507	1890	0.4	622	401	2290	0.4	784	474
8-# 7	21	1940	0.5	565	355	2340	0.5	717	422	1810	0.5	518	334	2170	0.5	654	395
4x-2y	25	1840	0.7	339	213	2190	0.7	430	253	1720	0.7	311	200	2030	0.7	392	237
	40	1400	0.9	113	71	1560	0.9	143	84	1300	0.9	103	66	1430	0.9	130	79
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		553	384	7.20	6.00	553	384	7.20	6.00	504	350	7.20	6.00	504	350	7.20	6.00
2.00 %	0	2360	0.0	1130	794	2890	0.0	1400	914	2220	0.0	1050	757	2700	0.0	1280	865
Ar(in²)	11	2280	0.2	1020	714	2770	0.2	1260	822	2140	0.2	943	681	2580	0.2	1160	778
= 9.60	13	2240	0.3	889	625	2720	0.3	1100	719	2110	0.3	825	596	2530	0.3	1010	681
	17	2160	0.4	762	536	2600	0.4	943	617	2030	0.4	707	511	2420	0.4	867	584
16-# 7	21	2070	0.5	635	446	2460	0.5	786	514	1940	0.5	589	426	2280	0.5	722	486
4x-6y	25	1950	0.7	381	268	2290	0.7	471	308	1830	0.7	353	255	2130	0.7	433	292
	40	1450	0.9	127	89	1600	0.9	157	102	1350	0.9	117	85	1470	0.9	144	97
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		552	383	7.20	6.00	552	383	7.20	6.00	503	349	7.20	6.00	503	349	7.20	6.00
2.60 %	0	2460	0.0	1310	807	2990	0.0	1580	927	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	2370	0.2	1180	727	2860	0.2	1430	834	0	0.2	0	0	0	0.2	0	0
=12.48	13	2330	0.3	1040	636	2800	0.3	1250	730	0	0.3	0	0	0	0.3	0	0
	17	2250	0.4	887	545	2680	0.4	1070	626	0	0.4	0	0	0	0.4	0	0
8-#11	21	2140	0.5	739	454	2530	0.5	891	521	0	0.5	0	0	0	0.5	0	0
4x-2y	25	2020	0.7	443	272	2350	0.7	534	313	0	0.7	0	0	0	0.7	0	0
	40	1480	0.9	147	90	1620	0.9	178	104	0	0.9	0	0	0	0.9	0	0
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		551	382	7.20	6.00	551	382	7.20	6.00	0	0	.00	.00	0	0	.00	.00
3.75 %	0	2650	0.0	1530	903	3180	0.0	1800	1020	2510	0.0	1450	866	2980	0.0	1690	974
Ar(in²)	11	2540	0.2	1380	813	3030	0.2	1620	920	2400	0.2	1300	780	2840	0.2	1520	876
=18.00	13	2500	0.3	1210	711	2970	0.3	1420	805	2360	0.3	1140	682	2780	0.3	1330	767
	17	2400	0.4	1030	609	2830	0.4	1220	690	2260	0.4	978	585	2640	0.4	1140	657
8-#14	21	2280	0.5	861	508	2650	0.5	1010	575	2150	0.5	815	487	2480	0.5	950	547
4x-2y	25	2140	0.7	516	304	2460	0.7	607	345	2010	0.7	489	292	2290	0.7	570	328
	40	1530	0.9	172	101	1650	0.9	202	115	1420	0.9	163	97	1520	0.9	190	109
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		550	382	7.20	6.00	550	382	7.20	6.00	501	348	7.20	6.00	501	348	7.20	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 3.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 20 x 24

Designation		W 12 x120								W 12 x106							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	1840	0.0	739	511	2260	0.0	951	608	1720	0.0	670	479	2090	0.0	859	568
Ar(in²)	11	1780	0.2	665	460	2170	0.2	856	548	1660	0.2	603	431	2010	0.2	773	511
= 2.40	13	1760	0.3	582	402	2130	0.3	749	479	1640	0.3	527	377	1970	0.3	676	447
	17	1700	0.4	498	345	2050	0.4	642	411	1580	0.4	452	323	1890	0.4	580	383
4-# 7	21	1630	0.5	415	287	1940	0.5	535	342	1510	0.5	377	269	1790	0.5	483	319
2x-2y	25	1540	0.7	249	172	1820	0.7	321	205	1440	0.7	226	161	1680	0.7	290	191
	40	1170	0.9	83	57	1290	0.9	107	68	1080	0.9	75	53	1190	0.9	96	63
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		458	318	7.20	6.00	458	318	7.20	6.00	417	289	7.20	6.00	417	289	7.20	6.00
1.00 %	0	1920	0.0	842	558	2340	0.0	1060	656	1810	0.0	773	526	2180	0.0	962	615
Ar(in²)	11	1860	0.2	758	502	2240	0.2	949	590	1740	0.2	696	473	2080	0.2	866	554
= 4.80	13	1830	0.3	663	439	2210	0.3	831	516	1710	0.3	609	414	2040	0.3	758	485
	17	1770	0.4	568	376	2110	0.4	712	442	1650	0.4	522	355	1960	0.4	649	415
8-# 7	21	1690	0.5	474	314	2000	0.5	593	369	1580	0.5	435	296	1850	0.5	541	346
4x-2y	25	1600	0.7	284	188	1870	0.7	356	221	1490	0.7	261	177	1730	0.7	324	207
	40	1200	0.9	94	62	1310	0.9	118	73	1100	0.9	87	59	1200	0.9	108	69
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		458	318	7.20	6.00	458	318	7.20	6.00	416	289	7.20	6.00	416	289	7.20	6.00
1.98 %	0	2080	0.0	1010	700	2500	0.0	1220	797	1970	0.0	938	668	2340	0.0	1130	757
Ar(in²)	11	2000	0.2	906	630	2390	0.2	1100	718	1890	0.2	844	601	2230	0.2	1010	681
= 9.48	13	1970	0.3	793	551	2350	0.3	960	628	1860	0.3	739	526	2180	0.3	887	596
	17	1900	0.4	680	472	2240	0.4	823	538	1780	0.4	633	451	2080	0.4	760	511
12-# 8	21	1810	0.5	566	393	2110	0.5	686	448	1700	0.5	528	376	1960	0.5	634	426
4x-4y	25	1700	0.7	340	236	1960	0.7	411	269	1590	0.7	316	225	1820	0.7	380	255
	40	1240	0.9	113	78	1350	0.9	137	89	1150	0.9	105	75	1240	0.9	126	85
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		457	317	7.20	6.00	457	317	7.20	6.00	415	288	7.20	6.00	415	288	7.20	6.00
3.33 %	0	2310	0.0	1270	915	2730	0.0	1480	1010	2190	0.0	1200	884	2560	0.0	1390	972
Ar(in²)	11	2210	0.2	1140	824	2590	0.2	1330	911	2090	0.2	1080	795	2430	0.2	1250	875
=16.00	13	2170	0.3	999	721	2540	0.3	1170	797	2050	0.3	945	696	2380	0.3	1090	766
	17	2080	0.4	856	618	2410	0.4	999	683	1960	0.4	810	596	2260	0.4	937	656
4-#18	21	1970	0.5	713	515	2260	0.5	832	569	1860	0.5	675	497	2110	0.5	780	547
2x-2y	25	1840	0.7	428	309	2090	0.7	499	341	1730	0.7	405	298	1950	0.7	468	328
	40	1300	0.9	142	103	1380	0.9	166	113	1200	0.9	135	99	1270	0.9	156	109
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		455	316	7.20	6.00	455	316	7.20	6.00	414	287	7.20	6.00	414	287	7.20	6.00
3.75 %	0	2380	0.0	1370	831	2800	0.0	1580	927	2260	0.0	1300	799	2630	0.0	1490	888
Ar(in²)	11	2270	0.2	1230	748	2650	0.2	1420	835	2150	0.2	1170	719	2490	0.2	1340	799
=18.00	13	2230	0.3	1080	654	2600	0.3	1250	730	2110	0.3	1030	629	2440	0.3	1170	699
	17	2130	0.4	925	561	2470	0.4	1070	626	2020	0.4	878	539	2310	0.4	1010	599
8-#14	21	2020	0.5	771	467	2310	0.5	889	521	1900	0.5	732	449	2150	0.5	838	499
4x-2y	25	1890	0.7	462	280	2130	0.7	533	313	1770	0.7	439	269	1980	0.7	502	299
	40	1310	0.9	154	93	1390	0.9	177	104	1220	0.9	146	89	1280	0.9	167	99
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		455	316	7.20	6.00	455	316	7.20	6.00	414	287	7.20	6.00	414	287	7.20	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 20 x 24

Designation		W 12 x 96								W 12 x 87							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	1640	0.0	620	454	1970	0.0	791	538	1560	0.0	576	432	1870	0.0	730	509
Ar(in²)	11	1580	0.2	558	409	1890	0.2	712	484	1500	0.2	519	388	1780	0.2	657	458
= 2.40	13	1560	0.3	488	358	1860	0.3	623	423	1480	0.3	454	340	1750	0.3	575	401
	17	1500	0.4	418	307	1780	0.4	534	363	1430	0.4	389	291	1680	0.4	492	344
4-# 7	21	1430	0.5	349	255	1680	0.5	445	302	1360	0.5	324	243	1590	0.5	410	286
2x-2y	25	1360	0.7	209	153	1570	0.7	267	181	1290	0.7	194	145	1480	0.7	246	172
	40	1010	0.9	69	51	1110	0.9	89	60	955	0.9	64	48	1040	0.9	82	57
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		387	268	7.20	6.00	387	268	7.20	6.00	360	250	7.20	6.00	360	250	7.20	6.00
1.00 %	0	1720	0.0	724	502	2050	0.0	895	585	1640	0.0	680	479	1950	0.0	834	556
Ar(in²)	11	1650	0.2	651	451	1960	0.2	805	526	1580	0.2	612	431	1860	0.2	750	501
= 4.80	13	1630	0.3	570	395	1930	0.3	704	461	1560	0.3	535	377	1830	0.3	656	438
	17	1570	0.4	488	338	1840	0.4	604	395	1500	0.4	459	323	1740	0.4	562	375
8-# 7	21	1500	0.5	407	282	1740	0.5	503	329	1420	0.5	382	269	1640	0.5	469	313
4x-2y	25	1410	0.7	244	169	1620	0.7	302	197	1340	0.7	229	161	1530	0.7	281	187
	40	1040	0.9	81	56	1120	0.9	100	65	979	0.9	76	53	1050	0.9	93	62
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		386	268	7.20	6.00	386	268	7.20	6.00	360	250	7.20	6.00	360	250	7.20	6.00
1.98 %	0	1880	0.0	889	644	2210	0.0	1060	727	1800	0.0	845	622	2110	0.0	998	699
Ar(in²)	11	1800	0.2	800	580	2110	0.2	953	654	1730	0.2	760	559	2000	0.2	899	629
= 9.48	13	1770	0.3	700	507	2070	0.3	834	572	1700	0.3	665	489	1960	0.3	786	550
	17	1700	0.4	600	435	1970	0.4	715	491	1630	0.4	570	419	1870	0.4	674	471
12-# 8	21	1610	0.5	500	362	1850	0.5	596	409	1540	0.5	475	349	1750	0.5	561	393
4x-4y	25	1510	0.7	300	217	1720	0.7	357	245	1440	0.7	285	209	1620	0.7	337	235
	40	1080	0.9	100	72	1150	0.9	119	81	1020	0.9	95	69	1080	0.9	112	78
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		385	267	7.20	6.00	385	267	7.20	6.00	359	249	7.20	6.00	359	249	7.20	6.00
3.33 %	0	2100	0.0	1150	860	2440	0.0	1320	942	2030	0.0	1110	837	2330	0.0	1260	914
Ar(in²)	11	2000	0.2	1040	774	2310	0.2	1190	848	1930	0.2	996	754	2200	0.2	1130	822
=16.00	13	1970	0.3	906	677	2260	0.3	1040	742	1890	0.3	871	659	2160	0.3	992	720
	17	1880	0.4	776	580	2140	0.4	891	636	1800	0.4	747	565	2040	0.4	850	617
4-#18	21	1770	0.5	647	483	2000	0.5	743	530	1700	0.5	622	471	1900	0.5	709	514
2x-2y	25	1650	0.7	388	290	1840	0.7	445	318	1580	0.7	373	282	1750	0.7	425	308
	40	1130	0.9	129	96	1190	0.9	148	106	1070	0.9	124	94	1110	0.9	141	102
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		384	266	7.20	6.00	384	266	7.20	6.00	357	248	7.20	6.00	357	248	7.20	6.00
3.75 %	0	2170	0.0	1250	775	2500	0.0	1420	858	2090	0.0	1210	754	2400	0.0	1360	829
Ar(in²)	11	2070	0.2	1130	698	2370	0.2	1280	772	1990	0.2	1090	678	2260	0.2	1230	746
=18.00	13	2030	0.3	986	610	2320	0.3	1120	675	1950	0.3	951	593	2210	0.3	1070	653
	17	1930	0.4	845	523	2190	0.4	960	579	1860	0.4	815	509	2090	0.4	919	560
8-#14	21	1820	0.5	704	436	2040	0.5	800	482	1740	0.5	679	424	1940	0.5	766	466
4x-2y	25	1690	0.7	422	261	1880	0.7	480	289	1620	0.7	407	254	1780	0.7	459	280
	40	1140	0.9	140	87	1190	0.9	160	96	1080	0.9	135	84	1120	0.9	153	93
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		383	266	7.20	6.00	383	266	7.20	6.00	357	248	7.20	6.00	357	248	7.20	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 20 x 24

Designation		W 12 x 79								W 12 x 72							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	1490	0.0	537	411	1770	0.0	676	484	1430	0.0	504	392	1680	0.0	629	461
Ar(in²)	11	1440	0.2	483	370	1690	0.2	608	435	1380	0.2	453	353	1610	0.2	566	415
= 2.40	13	1410	0.3	423	323	1660	0.3	532	381	1350	0.3	397	309	1580	0.3	495	363
	17	1360	0.4	362	277	1590	0.4	456	326	1300	0.4	340	265	1510	0.4	425	311
4-# 7	21	1300	0.5	302	231	1500	0.5	380	272	1240	0.5	283	220	1420	0.5	354	259
2x-2y	25	1230	0.7	181	138	1400	0.7	228	163	1170	0.7	170	132	1330	0.7	212	155
	40	902	0.9	60	46	974	0.9	76	54	855	0.9	56	44	918	0.9	70	51
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		336	233	7.20	6.00	336	233	7.20	6.00	315	219	7.20	6.00	315	219	7.20	6.00
1.00 %	0	1570	0.0	641	458	1850	0.0	779	531	1510	0.0	607	440	1760	0.0	733	508
Ar(in²)	11	1510	0.2	577	412	1760	0.2	701	478	1450	0.2	547	396	1680	0.2	660	457
= 4.80	13	1490	0.3	505	361	1730	0.3	614	418	1430	0.3	478	346	1650	0.3	577	400
	17	1430	0.4	432	309	1650	0.4	526	358	1370	0.4	410	297	1570	0.4	495	343
8-# 7	21	1360	0.5	360	258	1560	0.5	438	298	1300	0.5	341	247	1480	0.5	412	286
4x-2y	25	1280	0.7	216	154	1450	0.7	263	179	1220	0.7	205	148	1380	0.7	247	171
	40	925	0.9	72	51	990	0.9	87	59	877	0.9	68	49	934	0.9	82	57
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		336	233	7.20	6.00	336	233	7.20	6.00	314	218	7.20	6.00	314	218	7.20	6.00
1.98 %	0	1730	0.0	806	601	2010	0.0	944	673	1670	0.0	772	582	1920	0.0	898	650
Ar(in²)	11	1660	0.2	725	541	1910	0.2	850	606	1600	0.2	695	524	1820	0.2	808	585
= 9.48	13	1630	0.3	634	473	1870	0.3	743	530	1570	0.3	608	458	1790	0.3	707	512
	17	1560	0.4	544	405	1780	0.4	637	454	1500	0.4	521	393	1700	0.4	606	439
12-# 8	21	1470	0.5	453	338	1670	0.5	531	378	1420	0.5	434	327	1590	0.5	505	366
4x-4y	25	1380	0.7	272	202	1540	0.7	318	227	1320	0.7	260	196	1470	0.7	303	219
	40	963	0.9	90	67	1020	0.9	106	75	913	0.9	86	65	959	0.9	101	73
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		335	232	7.20	6.00	335	232	7.20	6.00	313	218	7.20	6.00	313	218	7.20	6.00
3.33 %	0	1960	0.0	1070	817	2230	0.0	1210	889	1890	0.0	1030	799	2150	0.0	1160	866
Ar(in²)	11	1860	0.2	960	735	2110	0.2	1090	800	1800	0.2	930	719	2020	0.2	1040	779
=16.00	13	1820	0.3	840	643	2060	0.3	949	700	1760	0.3	814	629	1980	0.3	913	682
	17	1730	0.4	720	551	1950	0.4	814	600	1670	0.4	698	539	1860	0.4	782	584
4-#18	21	1630	0.5	600	459	1810	0.5	678	500	1570	0.5	581	449	1730	0.5	652	487
2x-2y	25	1510	0.7	360	275	1660	0.7	407	300	1450	0.7	349	269	1580	0.7	391	292
	40	1010	0.9	120	91	1050	0.9	135	100	952	0.9	116	89	984	0.9	130	97
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		333	231	7.20	6.00	333	231	7.20	6.00	312	217	7.20	6.00	312	217	7.20	6.00
3.75 %	0	2020	0.0	1170	733	2300	0.0	1310	804	1960	0.0	1140	714	2210	0.0	1260	781
Ar(in²)	11	1920	0.2	1050	660	2170	0.2	1180	723	1860	0.2	1020	643	2080	0.2	1140	703
=18.00	13	1880	0.3	920	577	2120	0.3	1030	633	1820	0.3	894	563	2030	0.3	993	615
	17	1790	0.4	789	495	2000	0.4	882	542	1730	0.4	766	482	1910	0.4	851	527
8-#14	21	1670	0.5	657	412	1850	0.5	735	452	1610	0.5	638	402	1770	0.5	709	439
4x-2y	25	1550	0.7	394	247	1690	0.7	441	271	1490	0.7	383	241	1620	0.7	425	263
	40	1020	0.9	131	82	1050	0.9	147	90	961	0.9	127	80	990	0.9	141	87
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		333	231	7.20	6.00	333	231	7.20	6.00	312	216	7.20	6.00	312	216	7.20	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 24

Designation		W 10 x112								W 10 x100							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.50 %	0	1770	0.0	645	466	2160	0.0	815	547	1670	0.0	593	441	2020	0.0	743	515
Ar(in²)	11	1710	0.2	580	419	2070	0.2	733	493	1610	0.2	534	397	1940	0.2	669	464
= 2.40	13	1690	0.3	508	367	2040	0.3	641	431	1590	0.3	467	347	1900	0.3	585	406
	17	1630	0.4	435	314	1950	0.4	550	369	1530	0.4	400	297	1820	0.4	502	348
4-# 7	21	1560	0.5	362	262	1850	0.5	458	308	1470	0.5	333	248	1730	0.5	418	290
2x-2y	25	1480	0.7	217	157	1740	0.7	275	184	1390	0.7	200	148	1610	0.7	251	174
	40	1120	0.9	72	52	1230	0.9	91	61	1040	0.9	66	49	1140	0.9	83	58
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		434	301	7.20	6.00	434	301	7.20	6.00	399	277	7.20	6.00	399	277	7.20	6.00
1.00 %	0	1850	0.0	748	513	2250	0.0	918	594	1750	0.0	697	488	2100	0.0	847	563
Ar(in²)	11	1790	0.2	673	462	2150	0.2	826	535	1690	0.2	627	439	2010	0.2	762	506
= 4.80	13	1760	0.3	589	404	2110	0.3	723	468	1660	0.3	548	384	1970	0.3	667	443
	17	1700	0.4	505	346	2020	0.4	620	401	1600	0.4	470	329	1890	0.4	572	380
8-# 7	21	1620	0.5	421	289	1910	0.5	516	334	1530	0.5	392	274	1780	0.5	476	316
4x-2y	25	1530	0.7	252	173	1790	0.7	310	200	1440	0.7	235	164	1660	0.7	286	190
	40	1140	0.9	84	57	1250	0.9	103	66	1060	0.9	78	54	1160	0.9	95	63
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		434	301	7.20	6.00	434	301	7.20	6.00	398	276	7.20	6.00	398	276	7.20	6.00
1.98 %	0	2010	0.0	912	655	2410	0.0	1080	736	1910	0.0	861	630	2260	0.0	1010	704
Ar(in²)	11	1940	0.2	821	590	2290	0.2	974	663	1840	0.2	775	567	2160	0.2	910	634
= 9.48	13	1910	0.3	718	516	2250	0.3	852	580	1810	0.3	678	496	2110	0.3	796	555
	17	1830	0.4	616	442	2150	0.4	730	497	1730	0.4	581	425	2010	0.4	682	475
12-# 8	21	1740	0.5	513	368	2020	0.5	609	414	1650	0.5	484	354	1890	0.5	569	396
4x-4y	25	1640	0.7	308	221	1880	0.7	365	248	1550	0.7	290	212	1760	0.7	341	237
	40	1190	0.9	102	73	1280	0.9	121	82	1110	0.9	96	70	1190	0.9	113	79
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		433	300	7.20	6.00	433	300	7.20	6.00	397	276	7.20	6.00	397	276	7.20	6.00
3.17 %	0	2210	0.0	1110	790	2600	0.0	1280	870	2110	0.0	1060	765	2460	0.0	1210	839
Ar(in²)	11	2120	0.2	1000	711	2470	0.2	1160	783	2020	0.2	956	688	2330	0.2	1090	755
=15.24	13	2080	0.3	877	622	2420	0.3	1010	685	1980	0.3	837	602	2280	0.3	955	660
	17	1990	0.4	752	533	2300	0.4	866	587	1890	0.4	717	516	2170	0.4	818	566
12-#10	21	1880	0.5	626	444	2160	0.5	722	489	1790	0.5	597	430	2030	0.5	682	472
4x-4y	25	1760	0.7	376	266	1990	0.7	433	293	1670	0.7	358	258	1870	0.7	409	283
	40	1240	0.9	125	88	1310	0.9	144	97	1150	0.9	119	86	1220	0.9	136	94
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		431	299	7.20	6.00	431	299	7.20	6.00	396	275	7.20	6.00	396	275	7.20	6.00
3.90 %	0	2330	0.0	1220	891	2720	0.0	1390	972	2230	0.0	1170	867	2580	0.0	1320	940
Ar(in²)	11	2220	0.2	1100	802	2580	0.2	1250	875	2120	0.2	1050	780	2440	0.2	1190	846
=18.72	13	2180	0.3	960	702	2520	0.3	1090	765	2080	0.3	919	682	2380	0.3	1040	740
	17	2090	0.4	823	602	2390	0.4	937	656	1990	0.4	788	585	2260	0.4	889	634
12-#11	21	1970	0.5	685	501	2230	0.5	781	546	1870	0.5	656	487	2100	0.5	741	529
4x-4y	25	1830	0.7	411	301	2060	0.7	468	328	1740	0.7	394	292	1930	0.7	444	317
	40	1260	0.9	137	100	1330	0.9	156	109	1180	0.9	131	97	1230	0.9	148	105
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		431	299	7.20	6.00	431	299	7.20	6.00	395	274	7.20	6.00	395	274	7.20	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85   f'c : 3.0 ksi NW
φb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 20 x 24

Designation		W 10 x 88								W 10 x 77							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.50 %	0	1570	0.0	543	415	1880	0.0	674	483	1470	0.0	497	390	1740	0.0	611	452
Ar(in²)	11	1510	0.2	489	373	1800	0.2	607	435	1420	0.2	447	351	1670	0.2	550	407
= 2.40	13	1490	0.3	428	327	1760	0.3	531	380	1400	0.3	391	307	1640	0.3	481	356
	17	1440	0.4	366	280	1690	0.4	455	326	1340	0.4	335	263	1560	0.4	412	305
4-# 7	21	1370	0.5	305	233	1600	0.5	379	272	1280	0.5	279	219	1480	0.5	343	254
2x-2y	25	1300	0.7	183	140	1490	0.7	227	163	1210	0.7	167	131	1380	0.7	206	152
	40	962	0.9	61	46	1050	0.9	75	54	888	0.9	55	43	958	0.9	68	50
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		363	252	7.20	6.00	363	252	7.20	6.00	330	229	7.20	6.00	330	229	7.20	6.00
1.00 %	0	1650	0.0	646	462	1960	0.0	778	530	1560	0.0	601	437	1820	0.0	714	500
Ar(in²)	11	1590	0.2	582	416	1870	0.2	700	477	1490	0.2	541	394	1740	0.2	643	450
= 4.80	13	1560	0.3	509	364	1840	0.3	612	418	1470	0.3	473	344	1710	0.3	562	393
	17	1500	0.4	436	312	1750	0.4	525	358	1410	0.4	405	295	1630	0.4	482	337
8-# 7	21	1430	0.5	363	260	1660	0.5	437	298	1340	0.5	338	246	1530	0.5	402	281
4x-2y	25	1350	0.7	218	156	1540	0.7	262	179	1260	0.7	202	147	1430	0.7	241	168
	40	986	0.9	72	52	1060	0.9	87	59	911	0.9	67	49	974	0.9	80	56
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		363	252	7.20	6.00	363	252	7.20	6.00	330	229	7.20	6.00	330	229	7.20	6.00
1.98 %	0	1810	0.0	811	605	2120	0.0	942	672	1720	0.0	765	580	1980	0.0	879	642
Ar(in²)	11	1740	0.2	730	544	2020	0.2	848	605	1640	0.2	688	522	1880	0.2	791	578
= 9.48	13	1710	0.3	638	476	1980	0.3	742	529	1610	0.3	602	456	1850	0.3	692	505
	17	1630	0.4	547	408	1880	0.4	636	454	1540	0.4	516	391	1750	0.4	593	433
12-# 8	21	1550	0.5	456	340	1770	0.5	530	378	1460	0.5	430	326	1640	0.5	494	361
4x-4y	25	1450	0.7	273	204	1640	0.7	318	227	1360	0.7	258	195	1520	0.7	296	216
	40	1030	0.9	91	68	1090	0.9	106	75	949	0.9	86	65	1000	0.9	98	72
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		362	251	7.20	6.00	362	251	7.20	6.00	329	228	7.20	6.00	329	228	7.20	6.00
3.17 %	0	2010	0.0	1010	739	2320	0.0	1140	807	1910	0.0	967	715	2180	0.0	1080	776
Ar(in²)	11	1910	0.2	911	665	2190	0.2	1030	726	1820	0.2	870	643	2060	0.2	972	699
=15.24	13	1880	0.3	797	582	2140	0.3	900	635	1780	0.3	761	563	2010	0.3	850	611
	17	1790	0.4	683	499	2030	0.4	772	544	1700	0.4	652	482	1900	0.4	729	524
12-#10	21	1690	0.5	569	416	1900	0.5	643	454	1590	0.5	543	402	1770	0.5	607	436
4x-4y	25	1570	0.7	341	249	1740	0.7	386	272	1480	0.7	326	241	1620	0.7	364	262
	40	1070	0.9	113	83	1120	0.9	128	90	986	0.9	108	80	1030	0.9	121	87
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		361	250	7.20	6.00	361	250	7.20	6.00	327	227	7.20	6.00	327	227	7.20	6.00
3.90 %	0	2130	0.0	1120	841	2440	0.0	1250	908	2030	0.0	1070	817	2300	0.0	1190	878
Ar(in²)	11	2020	0.2	1010	757	2300	0.2	1120	817	1930	0.2	964	735	2170	0.2	1070	790
=18.72	13	1980	0.3	880	662	2250	0.3	983	715	1890	0.3	844	643	2110	0.3	933	691
	17	1880	0.4	754	568	2120	0.4	842	613	1790	0.4	723	551	1990	0.4	800	592
12-#11	21	1770	0.5	628	473	1970	0.5	702	511	1670	0.5	603	459	1850	0.5	666	494
4x-4y	25	1640	0.7	377	284	1810	0.7	421	306	1540	0.7	361	275	1680	0.7	400	296
	40	1090	0.9	125	94	1130	0.9	140	102	1000	0.9	120	91	1040	0.9	133	98
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		360	250	7.20	6.00	360	250	7.20	6.00	327	227	7.20	6.00	327	227	7.20	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 20 x 24

Designation		W 10 x 68								W							
Fy (ksi)		36				50											
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy								
.50 %	0	1400	0.0	460	368	1640	0.0	560	426								
Ar(in²)	11	1340	0.2	414	331	1560	0.2	504	384								
= 2.40	13	1320	0.3	362	290	1530	0.3	441	336								
	17	1270	0.4	311	248	1470	0.4	378	288								
4-# 7	21	1210	0.5	259	207	1380	0.5	315	240								
2x-2y	25	1140	0.7	155	124	1290	0.7	189	144								
	40	830	0.9	51	41	889	0.9	63	48								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		304	211	7.20	6.00	304	211	7.20	6.00								
1.00 %	0	1480	0.0	564	416	1720	0.0	663	474								
Ar(in²)	11	1420	0.2	507	374	1640	0.2	597	426								
= 4.80	13	1400	0.3	444	327	1610	0.3	522	373								
	17	1340	0.4	380	280	1530	0.4	448	320								
8-# 7	21	1270	0.5	317	234	1440	0.5	373	266								
4x-2y	25	1190	0.7	190	140	1340	0.7	224	160								
	40	851	0.9	63	46	904	0.9	74	53								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		303	211	7.20	6.00	303	211	7.20	6.00								
1.98 %	0	1640	0.0	728	558	1880	0.0	828	616								
Ar(in²)	11	1570	0.2	655	502	1780	0.2	745	554								
= 9.48	13	1540	0.3	573	440	1740	0.3	652	485								
	17	1470	0.4	491	377	1650	0.4	559	416								
12-# 8	21	1380	0.5	409	314	1550	0.5	465	346								
4x-4y	25	1290	0.7	245	188	1430	0.7	279	208								
	40	887	0.9	81	62	929	0.9	93	69								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		302	210	7.20	6.00	302	210	7.20	6.00								
3.17 %	0	1840	0.0	930	694	2070	0.0	1030	751								
Ar(in²)	11	1740	0.2	837	624	1960	0.2	926	675								
=15.24	13	1710	0.3	732	546	1910	0.3	810	591								
	17	1620	0.4	627	468	1800	0.4	695	506								
12-#10	21	1520	0.5	523	390	1670	0.5	579	422								
4x-4y	25	1400	0.7	313	234	1530	0.7	347	253								
	40	920	0.9	104	78	950	0.9	115	84								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		301	209	7.20	6.00	301	209	7.20	6.00								
3.90 %	0	1960	0.0	1040	795	2190	0.0	1130	852								
Ar(in²)	11	1850	0.2	931	716	2060	0.2	1020	767								
=18.72	13	1810	0.3	815	626	2010	0.3	893	671								
	17	1710	0.4	698	537	1890	0.4	765	575								
12-#11	21	1600	0.5	582	447	1750	0.5	638	479								
4x-4y	25	1470	0.7	349	268	1590	0.7	382	287								
	40	935	0.9	116	89	959	0.9	127	95								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		300	208	7.20	6.00	300	208	7.20	6.00								

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 20 x 20

Designation		W 14 x 82								W 14 x 74							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.60 %	0	1390	0.0	529	370	1680	0.0	687	425	1330	0.0	489	355	1590	0.0	632	407
Ar(in²)	11	1340	0.2	476	333	1610	0.2	618	382	1280	0.2	440	319	1520	0.2	569	366
= 2.40	13	1330	0.3	417	291	1580	0.3	541	334	1260	0.3	385	279	1490	0.3	498	321
	17	1280	0.4	357	249	1510	0.4	463	287	1210	0.4	330	239	1430	0.4	427	275
4-# 7	21	1220	0.5	297	208	1430	0.5	386	239	1160	0.5	275	199	1350	0.5	356	229
2x-2y	25	1160	0.7	178	124	1340	0.7	231	143	1100	0.7	165	119	1260	0.7	213	137
	40	861	0.9	59	41	940	0.9	77	47	810	0.9	55	39	880	0.9	71	45
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		232	228	6.05	6.00	232	228	6.05	6.00	214	212	6.04	6.00	214	212	6.04	6.00
.79 %	0	1420	0.0	554	395	1710	0.0	712	450	1350	0.0	514	380	1610	0.0	658	432
Ar(in²)	11	1370	0.2	499	355	1630	0.2	641	405	1300	0.2	463	342	1540	0.2	592	389
= 3.16	13	1350	0.3	437	311	1600	0.3	560	354	1280	0.3	405	299	1510	0.3	518	340
	17	1300	0.4	374	266	1530	0.4	480	303	1240	0.4	347	256	1450	0.4	444	292
4-# 8	21	1240	0.5	312	222	1450	0.5	400	253	1180	0.5	289	213	1370	0.5	370	243
2x-2y	25	1170	0.7	187	133	1360	0.7	240	151	1110	0.7	173	128	1280	0.7	222	146
	40	869	0.9	62	44	946	0.9	80	50	818	0.9	57	42	885	0.9	74	48
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		231	228	6.05	6.00	231	228	6.05	6.00	214	211	6.04	6.00	214	211	6.04	6.00
2.25 %	0	1620	0.0	735	573	1910	0.0	892	628	1550	0.0	695	558	1810	0.0	838	610
Ar(in²)	11	1550	0.2	661	516	1810	0.2	803	565	1490	0.2	625	502	1720	0.2	754	549
= 9.00	13	1530	0.3	579	451	1780	0.3	702	494	1460	0.3	547	440	1690	0.3	660	480
	17	1460	0.4	496	387	1690	0.4	602	424	1400	0.4	469	377	1600	0.4	565	412
4-#14	21	1390	0.5	413	322	1590	0.5	501	353	1320	0.5	391	314	1500	0.5	471	343
2x-2y	25	1300	0.7	248	193	1470	0.7	301	212	1240	0.7	234	188	1390	0.7	282	206
	40	923	0.9	82	64	984	0.9	100	70	869	0.9	78	62	921	0.9	94	68
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		231	227	6.05	6.00	231	227	6.05	6.00	213	211	6.04	6.00	213	211	6.04	6.00
3.12 %	0	1740	0.0	764	691	2030	0.0	916	745	1670	0.0	727	676	1930	0.0	864	728
Ar(in²)	11	1660	0.2	688	622	1920	0.2	824	671	1590	0.2	655	609	1830	0.2	777	655
=12.48	13	1630	0.3	602	544	1880	0.3	721	587	1570	0.3	573	532	1790	0.3	680	573
	17	1560	0.4	516	466	1780	0.4	618	503	1490	0.4	491	456	1700	0.4	583	491
8-#11	21	1470	0.5	430	388	1670	0.5	515	419	1410	0.5	409	380	1580	0.5	486	409
2x-4y	25	1370	0.7	258	233	1540	0.7	309	251	1310	0.7	245	228	1460	0.7	291	245
	40	950	0.9	86	77	1000	0.9	103	83	894	0.9	81	76	937	0.9	97	81
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		230	226	6.05	6.00	230	226	6.05	6.00	213	210	6.04	6.00	213	210	6.04	6.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 20

Designation		W 14 x 68								W 14 x 61							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.60 %	0	1280	0.0	456	342	1510	0.0	588	392	1210	0.0	419	327	1430	0.0	537	374
Ar(in²)	11	1230	0.2	411	308	1450	0.2	529	353	1170	0.2	377	294	1360	0.2	484	336
= 2.40	13	1210	0.3	359	269	1420	0.3	463	308	1150	0.3	330	257	1340	0.3	423	294
	17	1160	0.4	308	231	1360	0.4	397	264	1110	0.4	282	220	1280	0.4	363	252
4-# 7	21	1110	0.5	256	192	1280	0.5	331	220	1050	0.5	235	184	1210	0.5	302	210
2x-2y	25	1050	0.7	154	115	1200	0.7	198	132	991	0.7	141	110	1130	0.7	181	126
	40	770	0.9	51	38	832	0.9	66	44	723	0.9	47	36	776	0.9	60	42
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		200	199	6.01	6.00	200	199	6.01	6.00	184	184	6.00	6.00	184	184	6.00	6.00
.79 %	0	1300	0.0	481	367	1540	0.0	613	417	1240	0.0	444	352	1450	0.0	563	399
Ar(in²)	11	1250	0.2	433	330	1470	0.2	552	375	1190	0.2	400	317	1390	0.2	506	359
= 3.16	13	1230	0.3	379	289	1440	0.3	483	328	1170	0.3	350	277	1360	0.3	443	314
	17	1190	0.4	325	248	1380	0.4	414	281	1130	0.4	300	237	1300	0.4	380	269
4-# 8	21	1130	0.5	271	206	1300	0.5	345	234	1070	0.5	250	198	1220	0.5	316	224
2x-2y	25	1060	0.7	162	124	1210	0.7	207	140	1010	0.7	150	118	1140	0.7	190	134
	40	778	0.9	54	41	837	0.9	69	46	730	0.9	50	39	781	0.9	63	44
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		200	199	6.01	6.00	200	199	6.01	6.00	184	184	6.00	6.00	184	184	6.00	6.00
2.25 %	0	1500	0.0	662	546	1740	0.0	794	595	1440	0.0	625	530	1650	0.0	743	577
Ar(in²)	11	1430	0.2	596	491	1650	0.2	714	535	1370	0.2	562	477	1570	0.2	669	519
= 9.00	13	1410	0.3	521	430	1620	0.3	625	468	1350	0.3	492	418	1530	0.3	585	454
	17	1350	0.4	447	368	1540	0.4	536	401	1290	0.4	422	358	1450	0.4	502	389
4-#14	21	1270	0.5	372	307	1440	0.5	446	334	1210	0.5	351	298	1360	0.5	418	324
2x-2y	25	1190	0.7	223	184	1330	0.7	268	200	1130	0.7	211	179	1250	0.7	251	194
	40	827	0.9	74	61	871	0.9	89	66	776	0.9	70	59	813	0.9	83	64
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		199	198	6.01	6.00	199	198	6.01	6.00	183	183	6.00	6.00	183	183	6.00	6.00
3.12 %	0	1620	0.0	697	664	1860	0.0	822	713	1560	0.0	662	649	1770	0.0	773	695
Ar(in²)	11	1540	0.2	627	597	1760	0.2	739	641	1480	0.2	596	584	1670	0.2	696	625
=12.48	13	1510	0.3	549	523	1720	0.3	647	561	1450	0.3	521	511	1630	0.3	609	547
	17	1440	0.4	470	448	1630	0.4	554	481	1380	0.4	447	438	1540	0.4	522	469
8-#11	21	1360	0.5	392	373	1520	0.5	462	401	1300	0.5	372	365	1440	0.5	435	391
2x-4y	25	1260	0.7	235	224	1390	0.7	277	240	1200	0.7	223	219	1320	0.7	261	234
	40	850	0.9	78	74	886	0.9	92	80	797	0.9	74	73	827	0.9	87	78
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		198	197	6.01	6.00	198	197	6.01	6.00	183	183	6.00	6.00	183	183	6.00	6.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 20 x 20

Designation		W 12 x 96								W 12 x 87							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.60 %	0	1510	0.0	557	428	1850	0.0	724	507	1440	0.0	514	407	1740	0.0	664	480
Ar(in²)	11	1460	0.2	502	385	1770	0.2	651	456	1390	0.2	463	366	1670	0.2	598	432
= 2.40	13	1440	0.3	439	337	1740	0.3	570	399	1370	0.3	405	320	1640	0.3	523	378
	17	1390	0.4	376	289	1670	0.4	488	342	1320	0.4	347	275	1570	0.4	448	324
4-# 7	21	1330	0.5	313	241	1580	0.5	407	285	1260	0.5	289	229	1490	0.5	374	270
2x-2y	25	1260	0.7	188	144	1480	0.7	244	171	1190	0.7	173	137	1390	0.7	224	162
	40	951	0.9	62	48	1050	0.9	81	57	894	0.9	57	45	980	0.9	74	54
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		256	256	6.00	6.00	256	256	6.00	6.00	238	238	6.00	6.00	238	238	6.00	6.00
1.20 %	0	1600	0.0	615	510	1930	0.0	781	588	1520	0.0	571	489	1820	0.0	722	561
Ar(in²)	11	1540	0.2	553	459	1850	0.2	703	530	1460	0.2	514	440	1740	0.2	649	505
= 4.80	13	1520	0.3	484	401	1810	0.3	615	463	1440	0.3	450	385	1710	0.3	568	442
	17	1460	0.4	415	344	1740	0.4	527	397	1390	0.4	386	330	1640	0.4	487	379
8-# 7	21	1390	0.5	346	287	1640	0.5	439	331	1320	0.5	321	275	1550	0.5	406	315
2x-4y	25	1320	0.7	207	172	1530	0.7	263	198	1250	0.7	193	165	1440	0.7	243	189
	40	977	0.9	69	57	1070	0.9	87	66	919	0.9	64	55	998	0.9	81	63
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		256	256	6.00	6.00	256	256	6.00	6.00	238	238	6.00	6.00	238	238	6.00	6.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 20

Designation		W 12 x 79								W 12 x 72							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.60 %	0	1370	0.0	475	388	1640	0.0	612	455	1310	0.0	442	370	1560	0.0	567	434
Ar(in²)	11	1320	0.2	428	349	1570	0.2	551	410	1260	0.2	398	333	1490	0.2	510	391
= 2.40	13	1300	0.3	374	305	1550	0.3	482	359	1240	0.3	348	292	1460	0.3	446	342
	17	1250	0.4	321	262	1480	0.4	413	307	1200	0.4	298	250	1400	0.4	382	293
4-# 7	21	1200	0.5	267	218	1400	0.5	344	256	1140	0.5	248	208	1320	0.5	318	244
2x-2y	25	1130	0.7	160	131	1310	0.7	206	153	1080	0.7	149	125	1240	0.7	191	146
	40	841	0.9	53	43	917	0.9	68	51	795	0.9	49	41	861	0.9	63	48
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		221	221	6.00	6.00	221	221	6.00	6.00	207	207	6.00	6.00	207	207	6.00	6.00
.79 %	0	1390	0.0	500	413	1670	0.0	637	480	1330	0.0	467	395	1580	0.0	592	459
Ar(in²)	11	1340	0.2	450	371	1600	0.2	573	432	1280	0.2	420	356	1510	0.2	533	413
= 3.16	13	1320	0.3	394	325	1570	0.3	502	378	1260	0.3	368	311	1490	0.3	466	361
	17	1280	0.4	338	278	1500	0.4	430	324	1220	0.4	315	267	1420	0.4	399	310
4-# 8	21	1220	0.5	281	232	1420	0.5	358	270	1160	0.5	263	222	1340	0.5	333	258
2x-2y	25	1150	0.7	169	139	1320	0.7	215	162	1090	0.7	157	133	1250	0.7	199	155
	40	849	0.9	56	46	922	0.9	71	54	802	0.9	52	44	867	0.9	66	51
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		221	221	6.00	6.00	221	221	6.00	6.00	207	207	6.00	6.00	207	207	6.00	6.00
1.80 %	0	1530	0.0	615	517	1810	0.0	752	584	1470	0.0	582	500	1720	0.0	706	563
Ar(in²)	11	1470	0.2	554	465	1720	0.2	676	526	1410	0.2	524	450	1640	0.2	636	506
= 7.20	13	1450	0.3	484	407	1690	0.3	592	460	1390	0.3	458	393	1610	0.3	556	443
	17	1390	0.4	415	349	1610	0.4	507	394	1330	0.4	393	337	1530	0.4	477	380
12-# 7	21	1320	0.5	346	290	1510	0.5	423	328	1260	0.5	327	281	1440	0.5	397	316
4x-4y	25	1240	0.7	207	174	1410	0.7	253	197	1180	0.7	196	168	1330	0.7	238	190
	40	887	0.9	69	58	949	0.9	84	65	839	0.9	65	56	892	0.9	79	63
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		221	221	6.00	6.00	221	221	6.00	6.00	206	206	6.00	6.00	206	206	6.00	6.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 20

Designation		W 12 x 65								W 12 x 58							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	$Pu/(\phi cPn)$	Mux	Muy	ϕcPn	$Pu/(\phi cPn)$	Mux	Muy	ϕcPn	$Pu/(\phi cPn)$	Mux	Muy	ϕcPn	$Pu/(\phi cPn)$	Mux	Muy
.60 %	0	1250	0.0	409	353	1480	0.0	521	412	1190	0.0	378	321	1390	0.0	479	368
Ar(in²)	11	1200	0.2	368	317	1410	0.2	469	371	1140	0.2	340	289	1330	0.2	431	332
= 2.40	13	1180	0.3	322	278	1390	0.3	410	324	1120	0.3	298	253	1300	0.3	377	290
	17	1140	0.4	276	238	1320	0.4	352	278	1080	0.4	255	217	1240	0.4	323	249
4-# 7	21	1090	0.5	230	198	1250	0.5	293	232	1030	0.5	212	180	1170	0.5	269	207
2x-2y	25	1020	0.7	138	119	1170	0.7	176	139	968	0.7	127	108	1090	0.7	161	124
	40	750	0.9	46	39	808	0.9	58	46	703	0.9	42	36	752	0.9	53	41
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		193	193	6.00	6.00	193	193	6.00	6.00	178	178	6.00	6.00	178	178	6.00	6.00
.79 %	0	1280	0.0	434	378	1500	0.0	547	437	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	1230	0.2	391	340	1430	0.2	492	393	0	0.2	0	0	0	0.2	0	0
= 3.16	13	1210	0.3	342	297	1410	0.3	430	344	0	0.3	0	0	0	0.3	0	0
	17	1160	0.4	293	255	1340	0.4	369	295	0	0.4	0	0	0	0.4	0	0
4-# 8	21	1100	0.5	244	212	1270	0.5	307	246	0	0.5	0	0	0	0.5	0	0
2x-2y	25	1040	0.7	146	127	1180	0.7	184	147	0	0.7	0	0	0	0.7	0	0
	40	757	0.9	48	42	813	0.9	61	49	0	0.9	0	0	0	0.9	0	0
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		193	193	6.00	6.00	193	193	6.00	6.00	0	0	.00	.00	0	0	.00	.00
1.80 %	0	1410	0.0	550	482	1640	0.0	661	541	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	1350	0.2	495	434	1560	0.2	595	487	0	0.2	0	0	0	0.2	0	0
= 7.20	13	1330	0.3	433	379	1530	0.3	521	426	0	0.3	0	0	0	0.3	0	0
	17	1270	0.4	371	325	1450	0.4	446	365	0	0.4	0	0	0	0.4	0	0
12-# 7	21	1200	0.5	309	271	1360	0.5	372	304	0	0.5	0	0	0	0.5	0	0
4x-4y	25	1130	0.7	185	162	1260	0.7	223	182	0	0.7	0	0	0	0.7	0	0
	40	792	0.9	61	54	838	0.9	74	60	0	0.9	0	0	0	0.9	0	0
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		192	192	6.00	6.00	192	192	6.00	6.00	0	0	.00	.00	0	0	.00	.00
3.12 %	0	1590	0.0	650	675	1820	0.0	756	733	1530	0.0	621	643	1730	0.0	715	690
Ar(in²)	11	1520	0.2	585	607	1720	0.2	680	660	1460	0.2	559	579	1640	0.2	643	621
=12.48	13	1490	0.3	512	531	1680	0.3	595	577	1430	0.3	489	506	1600	0.3	563	543
	17	1420	0.4	439	455	1590	0.4	510	495	1350	0.4	419	434	1510	0.4	482	465
8-#11	21	1330	0.5	365	379	1480	0.5	425	412	1270	0.5	349	362	1400	0.5	402	388
2x-4y	25	1230	0.7	219	227	1360	0.7	255	247	1170	0.7	209	217	1280	0.7	241	232
	40	827	0.9	73	75	861	0.9	85	82	774	0.9	69	72	801	0.9	80	77
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		191	191	6.00	6.00	191	191	6.00	6.00	176	176	6.00	6.00	176	176	6.00	6.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = $Pex(KxLx)^2/10000.$ (kip-ft²), Cey = $Pey(KyLy)^2/10000.$ (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = $\phi bMnx$ and Muy = $\phi bMny$ when $Pu/(\phi cPn) = 0.0$

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 20 x 20

Designation		W 10 x112								W 10 x100							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.60 %	0	1650	0.0	574	437	2040	0.0	741	514	1550	0.0	523	413	1900	0.0	672	484
Ar(in²)	11	1600	0.2	517	393	1960	0.2	667	463	1500	0.2	471	372	1820	0.2	605	435
= 2.40	13	1570	0.3	452	344	1930	0.3	583	405	1480	0.3	412	325	1790	0.3	529	381
	17	1520	0.4	388	295	1850	0.4	500	347	1430	0.4	353	279	1710	0.4	453	326
4-# 7	21	1460	0.5	323	246	1750	0.5	417	289	1360	0.5	294	232	1630	0.5	378	272
2x-2y	25	1390	0.7	194	147	1640	0.7	250	173	1290	0.7	176	139	1520	0.7	226	163
	40	1050	0.9	64	49	1170	0.9	83	57	977	0.9	58	46	1080	0.9	75	54
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		289	289	6.00	6.00	289	289	6.00	6.00	265	265	6.00	6.00	265	265	6.00	6.00
1.00 %	0	1710	0.0	627	489	2100	0.0	793	566	1600	0.0	576	465	1950	0.0	724	536
Ar(in²)	11	1650	0.2	564	440	2010	0.2	714	509	1550	0.2	518	419	1870	0.2	652	482
= 4.00	13	1620	0.3	494	385	1970	0.3	625	446	1520	0.3	453	366	1840	0.3	570	422
	17	1570	0.4	423	330	1890	0.4	535	382	1470	0.4	389	314	1760	0.4	489	361
4-# 9	21	1500	0.5	353	275	1790	0.5	446	318	1410	0.5	324	261	1660	0.5	407	301
2x-2y	25	1420	0.7	211	165	1680	0.7	267	191	1330	0.7	194	157	1560	0.7	244	180
	40	1070	0.9	70	55	1190	0.9	89	63	995	0.9	64	52	1090	0.9	81	60
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		289	289	6.00	6.00	289	289	6.00	6.00	265	265	6.00	6.00	265	265	6.00	6.00
2.00 %	0	1840	0.0	762	553	2230	0.0	928	630	1740	0.0	711	529	2090	0.0	859	600
Ar(in²)	11	1770	0.2	686	498	2130	0.2	835	567	1670	0.2	640	476	1990	0.2	773	540
= 8.00	13	1750	0.3	600	435	2090	0.3	731	496	1650	0.3	560	417	1960	0.3	676	472
	17	1680	0.4	514	373	2000	0.4	626	425	1580	0.4	480	357	1870	0.4	580	405
8-# 9	21	1600	0.5	428	311	1890	0.5	522	354	1510	0.5	400	298	1760	0.5	483	337
4x-2y	25	1510	0.7	257	186	1760	0.7	313	212	1420	0.7	240	178	1640	0.7	290	202
	40	1110	0.9	85	62	1210	0.9	104	70	1040	0.9	80	59	1120	0.9	96	67
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		289	289	6.00	6.00	289	289	6.00	6.00	264	264	6.00	6.00	264	264	6.00	6.00
3.00 %	0	1980	0.0	847	687	2370	0.0	1010	763	1880	0.0	796	663	2230	0.0	944	733
Ar(in²)	11	1900	0.2	763	618	2260	0.2	912	687	1800	0.2	717	597	2120	0.2	849	660
=12.00	13	1870	0.3	667	541	2210	0.3	798	601	1770	0.3	627	522	2080	0.3	743	577
	17	1790	0.4	572	463	2110	0.4	684	515	1700	0.4	537	447	1970	0.4	637	495
12-# 9	21	1700	0.5	476	386	1980	0.5	570	429	1610	0.5	448	373	1850	0.5	531	412
4x-4y	25	1600	0.7	286	231	1840	0.7	342	257	1510	0.7	268	223	1720	0.7	318	247
	40	1150	0.9	95	77	1240	0.9	114	85	1070	0.9	89	74	1150	0.9	106	82
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		288	288	6.00	6.00	288	288	6.00	6.00	263	263	6.00	6.00	263	263	6.00	6.00
3.81 %	0	2090	0.0	930	760	2480	0.0	1100	836	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	2000	0.2	837	684	2360	0.2	986	753	0	0.2	0	0	0	0.2	0	0
=15.24	13	1970	0.3	732	599	2310	0.3	863	659	0	0.3	0	0	0	0.3	0	0
	17	1880	0.4	628	513	2190	0.4	740	564	0	0.4	0	0	0	0.4	0	0
12-#10	21	1780	0.5	523	427	2060	0.5	616	470	0	0.5	0	0	0	0.5	0	0
4x-4y	25	1670	0.7	314	256	1900	0.7	370	282	0	0.7	0	0	0	0.7	0	0
	40	1180	0.9	104	85	1260	0.9	123	94	0	0.9	0	0	0	0.9	0	0
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		287	287	6.00	6.00	287	287	6.00	6.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85   f'c : 3.0 ksi NW
φb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)   Column Size(b x h): 20 x 20

Designation		W 10 x 88								W 10 x 77							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.60 %	0	1450	0.0	474	389	1760	0.0	604	453	1350	0.0	428	366	1620	0.0	541	424
Ar(in²)	11	1400	0.2	426	350	1680	0.2	544	407	1300	0.2	385	329	1550	0.2	487	381
= 2.40	13	1380	0.3	373	306	1650	0.3	476	356	1280	0.3	337	288	1520	0.3	426	334
	17	1330	0.4	320	262	1580	0.4	408	305	1240	0.4	289	247	1460	0.4	365	286
4-# 7	21	1270	0.5	266	219	1500	0.5	340	254	1180	0.5	241	206	1380	0.5	304	238
2x-2y	25	1200	0.7	160	131	1400	0.7	204	152	1120	0.7	144	123	1290	0.7	182	143
	40	901	0.9	53	43	988	0.9	68	50	828	0.9	48	41	901	0.9	60	47
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		240	240	6.00	6.00	240	240	6.00	6.00	217	217	6.00	6.00	217	217	6.00	6.00
1.00 %	0	1500	0.0	526	441	1810	0.0	657	505	1410	0.0	481	418	1670	0.0	594	476
Ar(in²)	11	1450	0.2	474	397	1730	0.2	591	454	1350	0.2	433	376	1600	0.2	534	428
= 4.00	13	1430	0.3	414	347	1700	0.3	517	398	1330	0.3	379	329	1570	0.3	468	375
	17	1370	0.4	355	298	1630	0.4	443	341	1280	0.4	325	282	1500	0.4	401	321
4-# 9	21	1310	0.5	296	248	1540	0.5	369	284	1220	0.5	270	235	1420	0.5	334	268
2x-2y	25	1240	0.7	177	149	1440	0.7	221	170	1150	0.7	162	141	1320	0.7	200	160
	40	918	0.9	59	49	1000	0.9	73	56	844	0.9	54	47	912	0.9	66	53
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		240	240	6.00	6.00	240	240	6.00	6.00	217	217	6.00	6.00	217	217	6.00	6.00
2.00 %	0	1640	0.0	661	505	1950	0.0	791	569	1540	0.0	616	482	1810	0.0	729	540
Ar(in²)	11	1570	0.2	595	455	1850	0.2	712	512	1480	0.2	554	434	1720	0.2	656	486
= 8.00	13	1550	0.3	521	398	1820	0.3	623	448	1450	0.3	485	380	1690	0.3	574	425
	17	1490	0.4	446	341	1730	0.4	534	384	1390	0.4	416	325	1610	0.4	492	364
8-# 9	21	1410	0.5	372	284	1630	0.5	445	320	1320	0.5	346	271	1510	0.5	410	304
4x-2y	25	1330	0.7	223	170	1520	0.7	267	192	1240	0.7	208	162	1400	0.7	246	182
	40	956	0.9	74	56	1030	0.9	89	64	880	0.9	69	54	937	0.9	82	60
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		239	239	6.00	6.00	239	239	6.00	6.00	216	216	6.00	6.00	216	216	6.00	6.00
3.00 %	0	1770	0.0	747	639	2080	0.0	877	702	1680	0.0	701	616	1950	0.0	814	674
Ar(in²)	11	1700	0.2	672	575	1980	0.2	789	632	1600	0.2	631	555	1850	0.2	733	606
=12.00	13	1670	0.3	588	503	1940	0.3	690	553	1570	0.3	552	485	1810	0.3	641	530
	17	1600	0.4	504	431	1840	0.4	592	474	1500	0.4	473	416	1710	0.4	549	455
12-# 9	21	1510	0.5	420	359	1720	0.5	493	395	1420	0.5	394	346	1600	0.5	458	379
4x-4y	25	1410	0.7	252	215	1590	0.7	296	237	1320	0.7	236	208	1480	0.7	274	227
	40	989	0.9	84	71	1050	0.9	98	79	910	0.9	78	69	957	0.9	91	75
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		239	239	6.00	6.00	239	239	6.00	6.00	216	216	6.00	6.00	216	216	6.00	6.00
4.00 %	0	1910	0.0	883	794	2220	0.0	1010	857	1820	0.0	837	771	2080	0.0	950	828
Ar(in²)	11	1820	0.2	794	714	2100	0.2	911	771	1730	0.2	753	694	1970	0.2	855	745
=16.00	13	1790	0.3	695	625	2050	0.3	797	675	1690	0.3	659	607	1920	0.3	748	652
	17	1710	0.4	596	536	1940	0.4	683	578	1610	0.4	565	520	1820	0.4	641	559
4-#18	21	1610	0.5	496	446	1810	0.5	569	482	1510	0.5	471	434	1690	0.5	534	466
2x-2y	25	1490	0.7	298	268	1670	0.7	341	289	1400	0.7	282	260	1550	0.7	320	279
	40	1020	0.9	99	89	1070	0.9	113	96	935	0.9	94	86	973	0.9	106	93
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		238	238	6.00	6.00	238	238	6.00	6.00	215	215	6.00	6.00	215	215	6.00	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi_c = 0.85$ f'c : 3.0 ksi NW
$\phi_b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) — Column Size(b x h): 20 x 20

Designation		W 10 x 68								W 10 x 60							
Fy (ksi)		36				50				36				50			
Reinf.	KL	$\phi_c P_n$	$P_u/(\phi_c P_n)$	Mux	Muy	$\phi_c P_n$	$P_u/(\phi_c P_n)$	Mux	Muy	$\phi_c P_n$	$P_u/(\phi_c P_n)$	Mux	Muy	$\phi_c P_n$	$P_u/(\phi_c P_n)$	Mux	Muy
.60 %	0	1280	0.0	392	346	1510	0.0	491	399	1210	0.0	360	328	1420	0.0	447	377
Ar(in²)	11	1230	0.2	352	311	1450	0.2	441	359	1160	0.2	324	295	1350	0.2	402	339
= 2.40	13	1210	0.3	308	272	1420	0.3	386	314	1140	0.3	283	258	1330	0.3	352	297
	17	1160	0.4	264	233	1360	0.4	331	269	1100	0.4	243	221	1270	0.4	301	254
4-# 7	21	1110	0.5	220	194	1280	0.5	276	224	1040	0.5	202	184	1200	0.5	251	212
2x-2y	25	1050	0.7	132	116	1200	0.7	165	134	983	0.7	121	110	1110	0.7	150	127
	40	770	0.9	44	38	832	0.9	55	44	716	0.9	40	36	768	0.9	50	42
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		199	199	6.00	6.00	199	199	6.00	6.00	182	182	6.00	6.00	182	182	6.00	6.00
1.00 %	0	1330	0.0	444	398	1570	0.0	543	452	1260	0.0	413	380	1470	0.0	499	429
Ar(in²)	11	1280	0.2	400	358	1500	0.2	489	406	1210	0.2	371	342	1400	0.2	449	386
= 4.00	13	1260	0.3	350	314	1470	0.3	428	356	1190	0.3	325	299	1370	0.3	393	338
	17	1210	0.4	300	269	1400	0.4	366	305	1140	0.4	278	256	1310	0.4	337	290
4-# 9	21	1150	0.5	250	224	1320	0.5	305	254	1080	0.5	232	214	1230	0.5	281	241
2x-2y	25	1080	0.7	150	134	1230	0.7	183	152	1020	0.7	139	128	1150	0.7	168	145
	40	786	0.9	50	44	843	0.9	61	50	731	0.9	46	42	779	0.9	56	48
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		199	199	6.00	6.00	199	199	6.00	6.00	182	182	6.00	6.00	182	182	6.00	6.00
2.00 %	0	1470	0.0	579	463	1700	0.0	678	516	1400	0.0	548	445	1610	0.0	634	494
Ar(in²)	11	1400	0.2	521	416	1620	0.2	610	464	1330	0.2	493	400	1520	0.2	571	444
= 8.00	13	1380	0.3	456	364	1590	0.3	534	406	1310	0.3	431	350	1490	0.3	499	389
	17	1320	0.4	391	312	1510	0.4	458	348	1250	0.4	369	300	1420	0.4	428	333
8-# 9	21	1250	0.5	326	260	1410	0.5	381	290	1180	0.5	308	250	1330	0.5	356	277
4x-2y	25	1170	0.7	195	156	1310	0.7	229	174	1100	0.7	184	150	1220	0.7	214	166
	40	819	0.9	65	52	866	0.9	76	58	762	0.9	61	50	800	0.9	71	55
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		198	198	6.00	6.00	198	198	6.00	6.00	181	181	6.00	6.00	181	181	6.00	6.00
3.00 %	0	1600	0.0	665	597	1840	0.0	763	649	1530	0.0	633	579	1740	0.0	719	627
Ar(in²)	11	1530	0.2	598	537	1740	0.2	687	584	1460	0.2	570	521	1650	0.2	647	565
=12.00	13	1500	0.3	523	470	1700	0.3	601	511	1430	0.3	498	456	1610	0.3	566	494
	17	1430	0.4	448	403	1610	0.4	515	438	1360	0.4	427	390	1520	0.4	485	423
12-# 9	21	1340	0.5	374	335	1500	0.5	429	365	1280	0.5	356	325	1410	0.5	404	353
4x-4y	25	1250	0.7	224	201	1380	0.7	257	219	1180	0.7	213	195	1300	0.7	242	211
	40	847	0.9	74	67	885	0.9	85	73	787	0.9	71	65	816	0.9	80	70
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		198	198	6.00	6.00	198	198	6.00	6.00	181	181	6.00	6.00	181	181	6.00	6.00
4.00 %	0	1740	0.0	801	752	1980	0.0	899	804	1670	0.0	769	734	1880	0.0	855	782
Ar(in²)	11	1650	0.2	721	676	1860	0.2	809	724	1580	0.2	692	660	1770	0.2	770	704
=16.00	13	1620	0.3	630	592	1820	0.3	708	633	1550	0.3	605	578	1720	0.3	674	616
	17	1530	0.4	540	507	1720	0.4	607	543	1460	0.4	519	495	1620	0.4	577	528
4-#18	21	1440	0.5	450	423	1590	0.5	506	452	1370	0.5	432	412	1500	0.5	481	440
2x-2y	25	1330	0.7	270	253	1450	0.7	303	271	1260	0.7	259	247	1360	0.7	288	264
	40	868	0.9	90	84	898	0.9	101	90	806	0.9	86	82	827	0.9	96	88
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		197	197	6.00	6.00	197	197	6.00	6.00	180	180	6.00	6.00	180	180	6.00	6.00

Notes : 1. $Cex = Pex(KxLx)^2/10000.$ (kip-ft²), $Cey = Pey(KyLy)^2/10000.$ (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for $\phi_c P_n$, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. $Mux = \phi_b Mnx$ and $Muy = \phi_b Mny$ when $P_u/(\phi_c P_n) = 0.0$

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 20 x 20

Designation		W 8 x 67								W 8 x 58							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.60 %	0	1270	0.0	365	329	1500	0.0	447	374	1190	0.0	335	312	1390	0.0	405	353
Ar(in²)	11	1220	0.2	329	296	1430	0.2	402	336	1140	0.2	301	281	1330	0.2	365	317
= 2.40	13	1200	0.3	287	259	1410	0.3	352	294	1130	0.3	264	245	1310	0.3	319	278
	17	1160	0.4	246	222	1350	0.4	302	252	1080	0.4	226	210	1250	0.4	273	238
4-# 7	21	1100	0.5	205	185	1270	0.5	251	210	1030	0.5	188	175	1180	0.5	228	198
2x-2y	25	1040	0.7	123	111	1190	0.7	151	126	970	0.7	113	105	1100	0.7	136	119
	40	763	0.9	41	37	824	0.9	50	42	705	0.9	37	35	755	0.9	45	39
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		197	197	6.00	6.00	197	197	6.00	6.00	179	179	6.00	6.00	179	179	6.00	6.00
1.00 %	0	1320	0.0	418	382	1560	0.0	500	426	1250	0.0	387	364	1450	0.0	458	405
Ar(in²)	11	1270	0.2	376	343	1480	0.2	450	383	1200	0.2	349	328	1380	0.2	412	364
= 4.00	13	1250	0.3	329	300	1460	0.3	393	335	1180	0.3	305	287	1350	0.3	360	319
	17	1200	0.4	282	257	1390	0.4	337	287	1130	0.4	261	246	1290	0.4	309	273
4-# 9	21	1140	0.5	235	214	1310	0.5	281	239	1070	0.5	218	205	1220	0.5	257	227
2x-2y	25	1080	0.7	141	128	1220	0.7	168	143	1010	0.7	130	123	1130	0.7	154	136
	40	779	0.9	47	42	835	0.9	56	47	719	0.9	43	41	765	0.9	51	45
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		197	197	6.00	6.00	197	197	6.00	6.00	178	178	6.00	6.00	178	178	6.00	6.00
2.00 %	0	1460	0.0	552	446	1690	0.0	634	490	1380	0.0	522	429	1590	0.0	592	469
Ar(in²)	11	1390	0.2	497	401	1610	0.2	571	441	1320	0.2	470	386	1500	0.2	533	422
= 8.00	13	1370	0.3	435	351	1580	0.3	499	386	1300	0.3	411	337	1470	0.3	466	369
	17	1310	0.4	373	301	1500	0.4	428	331	1240	0.4	352	289	1400	0.4	400	316
8-# 9	21	1240	0.5	310	251	1400	0.5	356	275	1170	0.5	293	241	1310	0.5	333	264
4x-2y	25	1160	0.7	186	150	1300	0.7	214	165	1090	0.7	176	144	1210	0.7	200	158
	40	812	0.9	62	50	858	0.9	71	55	750	0.9	58	48	786	0.9	66	52
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		196	196	6.00	6.00	196	196	6.00	6.00	178	178	6.00	6.00	178	178	6.00	6.00
3.00 %	0	1590	0.0	637	580	1830	0.0	719	623	1520	0.0	607	563	1720	0.0	677	603
Ar(in²)	11	1520	0.2	574	522	1730	0.2	647	561	1440	0.2	546	506	1630	0.2	609	542
=12.00	13	1490	0.3	502	456	1690	0.3	566	491	1410	0.3	478	443	1590	0.3	533	474
	17	1420	0.4	430	391	1600	0.4	485	421	1350	0.4	410	380	1500	0.4	457	407
12-# 9	21	1340	0.5	358	326	1490	0.5	404	350	1260	0.5	341	316	1400	0.5	381	339
4x-4y	25	1240	0.7	215	195	1370	0.7	242	210	1170	0.7	205	190	1280	0.7	228	203
	40	839	0.9	71	65	876	0.9	80	70	774	0.9	68	63	802	0.9	76	67
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		195	195	6.00	6.00	195	195	6.00	6.00	177	177	6.00	6.00	177	177	6.00	6.00
4.00 %	0	1730	0.0	773	735	1970	0.0	855	778	1660	0.0	743	718	1860	0.0	813	757
Ar(in²)	11	1640	0.2	696	661	1850	0.2	769	700	1570	0.2	668	646	1750	0.2	732	682
=16.00	13	1610	0.3	609	578	1810	0.3	673	613	1530	0.3	585	565	1700	0.3	640	596
	17	1530	0.4	522	496	1700	0.4	577	525	1450	0.4	501	484	1600	0.4	549	511
4-#18	21	1430	0.5	435	413	1580	0.5	481	437	1350	0.5	418	403	1480	0.5	457	426
2x-2y	25	1320	0.7	261	248	1440	0.7	288	262	1240	0.7	250	242	1350	0.7	274	255
	40	861	0.9	87	82	889	0.9	96	87	792	0.9	83	80	813	0.9	91	85
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 13 in		195	195	6.00	6.00	195	195	6.00	6.00	177	177	6.00	6.00	177	177	6.00	6.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 18 x 20

Designation		W 12 x 79								W 12 x 72							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.67 %	0	1310	0.0	471	348	1580	0.0	607	413	1250	0.0	438	332	1500	0.0	562	392
Ar(in^2)	11	1250	0.2	424	313	1500	0.2	546	372	1190	0.2	394	298	1420	0.2	505	353
= 2.40	13	1230	0.3	371	274	1470	0.3	478	325	1170	0.3	345	261	1390	0.3	442	309
	17	1180	0.4	318	235	1390	0.4	409	279	1120	0.4	296	224	1310	0.4	379	265
4-# 7	21	1110	0.5	265	195	1300	0.5	341	232	1060	0.5	246	186	1230	0.5	316	220
2x-2y	25	1040	0.7	159	117	1200	0.7	204	139	984	0.7	148	112	1130	0.7	189	132
	40	725	0.9	53	39	775	0.9	68	46	682	0.9	49	37	726	0.9	63	44
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		215	174	6.00	5.40	215	174	6.00	5.40	201	162	6.00	5.40	201	162	6.00	5.40
.67 %	0	1310	0.0	471	348	1580	0.0	607	413	0	0.0	0	0	0	0.0	0	0
Ar(in^2)	11	1250	0.2	424	313	1500	0.2	546	372	0	0.2	0	0	0	0.2	0	0
= 2.40	13	1230	0.3	371	274	1470	0.3	478	325	0	0.3	0	0	0	0.3	0	0
	17	1180	0.4	318	235	1390	0.4	409	279	0	0.4	0	0	0	0.4	0	0
4-# 7	21	1110	0.5	265	195	1300	0.5	341	232	0	0.5	0	0	0	0.5	0	0
2x-2y	25	1040	0.7	159	117	1200	0.7	204	139	0	0.7	0	0	0	0.7	0	0
	40	725	0.9	53	39	775	0.9	68	46	0	0.9	0	0	0	0.9	0	0
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		215	174	6.00	5.40	215	174	6.00	5.40	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in^2)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in^2)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in^2)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 18 x 20

Designation		W 12 x 65								W 12 x 58							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.67 %	0	1190	0.0	405	315	1420	0.0	517	371	1130	0.0	374	283	1330	0.0	475	328
Ar(in²)	11	1130	0.2	365	283	1340	0.2	465	334	1070	0.2	337	255	1260	0.2	427	295
= 2.40	13	1110	0.3	319	248	1310	0.3	407	292	1050	0.3	295	223	1230	0.3	374	258
	17	1060	0.4	273	212	1240	0.4	349	250	1000	0.4	252	191	1160	0.4	320	221
4-# 7	21	1000	0.5	228	177	1160	0.5	291	209	945	0.5	210	159	1080	0.5	267	184
2x-2y	25	933	0.7	136	106	1060	0.7	174	125	879	0.7	126	95	991	0.7	160	110
	40	640	0.9	45	35	678	0.9	58	41	596	0.9	42	31	628	0.9	53	36
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		187	151	6.00	5.40	187	151	6.00	5.40	172	139	6.00	5.40	172	139	6.00	5.40
.88 %	0	1210	0.0	430	336	1440	0.0	542	393	1150	0.0	400	305	1360	0.0	500	349
Ar(in²)	11	1160	0.2	387	303	1360	0.2	488	353	1100	0.2	360	274	1280	0.2	450	314
= 3.16	13	1140	0.3	339	265	1330	0.3	427	309	1080	0.3	315	240	1250	0.3	394	275
	17	1080	0.4	290	227	1260	0.4	366	265	1030	0.4	270	206	1180	0.4	337	236
4-# 8	21	1020	0.5	242	189	1170	0.5	305	221	963	0.5	225	171	1100	0.5	281	196
2x-2y	25	948	0.7	145	113	1080	0.7	183	132	894	0.7	135	103	1010	0.7	168	118
	40	645	0.9	48	37	681	0.9	61	44	601	0.9	45	34	630	0.9	56	39
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		187	151	6.00	5.40	187	151	6.00	5.40	172	139	6.00	5.40	172	139	6.00	5.40
1.76 %	0	1320	0.0	538	381	1550	0.0	650	437	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	1250	0.2	484	342	1460	0.2	585	393	0	0.2	0	0	0	0.2	0	0
= 6.32	13	1230	0.3	424	300	1420	0.3	512	344	0	0.3	0	0	0	0.3	0	0
	17	1170	0.4	363	257	1340	0.4	438	295	0	0.4	0	0	0	0.4	0	0
8-# 8	21	1090	0.5	302	214	1240	0.5	365	245	0	0.5	0	0	0	0.5	0	0
4x-2y	25	1010	0.7	181	128	1130	0.7	219	147	0	0.7	0	0	0	0.7	0	0
	40	663	0.9	60	42	690	0.9	73	49	0	0.9	0	0	0	0.9	0	0
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		186	151	6.00	5.40	186	151	6.00	5.40	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = $Pex(KxLx)^2/10000$. (kip-ft²), Cey = $Pey(KyLy)^2/10000$. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 18 x 20

Designation		W 12 x 53								W 12 x 50							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.67 %	0	1090	0.0	350	272	1270	0.0	442	314	1060	0.0	337	254	1240	0.0	423	287
Ar(in²)	11	1030	0.2	315	245	1200	0.2	397	282	1010	0.2	304	229	1170	0.2	381	258
= 2.40	13	1010	0.3	276	214	1170	0.3	348	247	988	0.3	266	200	1140	0.3	333	226
	17	966	0.4	236	183	1110	0.4	298	212	941	0.4	228	172	1080	0.4	286	194
4-# 7	21	908	0.5	197	153	1030	0.5	248	176	883	0.5	190	143	999	0.5	238	161
2x-2y	25	842	0.7	118	91	945	0.7	149	106	819	0.7	114	86	914	0.7	143	97
	40	567	0.9	39	30	594	0.9	49	35	548	0.9	38	28	572	0.9	47	32
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		162	131	6.00	5.40	162	131	6.00	5.40	156	126	6.00	5.40	156	126	6.00	5.40
1.11 %	0	1140	0.0	403	317	1330	0.0	494	359	1110	0.0	390	300	1290	0.0	476	332
Ar(in²)	11	1080	0.2	363	285	1250	0.2	445	323	1060	0.2	351	270	1210	0.2	429	299
= 4.00	13	1060	0.3	317	250	1220	0.3	389	282	1040	0.3	307	236	1180	0.3	375	262
	17	1010	0.4	272	214	1150	0.4	333	242	983	0.4	263	202	1120	0.4	321	224
4-# 9	21	945	0.5	226	178	1070	0.5	278	202	920	0.5	219	168	1030	0.5	268	187
2x-2y	25	873	0.7	136	107	972	0.7	166	121	849	0.7	131	101	942	0.7	160	112
	40	576	0.9	45	35	599	0.9	55	40	556	0.9	43	33	577	0.9	53	37
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		162	131	6.00	5.40	162	131	6.00	5.40	156	126	6.00	5.40	156	126	6.00	5.40
2.00 %	0	1250	0.0	491	380	1440	0.0	581	421	1220	0.0	478	362	1400	0.0	563	395
Ar(in²)	11	1180	0.2	442	342	1350	0.2	523	379	1160	0.2	430	326	1310	0.2	507	355
= 7.20	13	1150	0.3	387	299	1310	0.3	458	332	1130	0.3	376	285	1280	0.3	443	311
	17	1090	0.4	331	256	1230	0.4	392	284	1070	0.4	322	244	1190	0.4	380	266
12-# 7	21	1020	0.5	276	213	1130	0.5	327	237	991	0.5	269	204	1100	0.5	317	222
4x-4y	25	932	0.7	165	128	1030	0.7	196	142	907	0.7	161	122	994	0.7	190	133
	40	590	0.9	55	42	606	0.9	65	47	569	0.9	53	40	583	0.9	63	44
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		161	131	6.00	5.40	161	131	6.00	5.40	155	126	6.00	5.40	155	126	6.00	5.40
2.67 %	0	1330	0.0	544	451	1520	0.0	630	492	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	1250	0.2	490	406	1420	0.2	567	443	0	0.2	0	0	0	0.2	0	0
= 9.60	13	1220	0.3	429	355	1380	0.3	496	388	0	0.3	0	0	0	0.3	0	0
	17	1150	0.4	367	304	1290	0.4	425	332	0	0.4	0	0	0	0.4	0	0
16-# 7	21	1070	0.5	306	254	1180	0.5	354	277	0	0.5	0	0	0	0.5	0	0
4x-6y	25	973	0.7	183	152	1060	0.7	212	166	0	0.7	0	0	0	0.7	0	0
	40	597	0.9	61	50	608	0.9	70	55	0	0.9	0	0	0	0.9	0	0
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		161	130	6.00	5.40	161	130	6.00	5.40	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 18 x 20

Designation		W 10 x112								W 10 x100							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.67 %	0	1590	0.0	568	394	1980	0.0	733	469	1490	0.0	518	371	1840	0.0	664	439
Ar(in²)	11	1530	0.2	511	355	1880	0.2	660	422	1430	0.2	466	334	1740	0.2	598	395
= 2.40	13	1500	0.3	447	310	1840	0.3	577	369	1400	0.3	408	292	1710	0.3	523	346
	17	1440	0.4	383	266	1750	0.4	495	317	1340	0.4	349	250	1620	0.4	448	296
4-# 7	21	1370	0.5	319	221	1640	0.5	412	264	1280	0.5	291	208	1520	0.5	373	247
2x-2y	25	1280	0.7	191	133	1520	0.7	247	158	1200	0.7	174	125	1400	0.7	224	148
	40	921	0.9	63	44	1000	0.9	82	52	851	0.9	58	41	922	0.9	74	49
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		283	229	6.00	5.40	283	229	6.00	5.40	259	210	6.00	5.40	259	210	6.00	5.40
1.11 %	0	1640	0.0	621	439	2040	0.0	786	514	1540	0.0	570	416	1890	0.0	717	484
Ar(in²)	11	1580	0.2	559	395	1930	0.2	707	463	1480	0.2	513	374	1790	0.2	645	436
= 4.00	13	1550	0.3	489	346	1890	0.3	618	405	1450	0.3	449	328	1760	0.3	564	381
	17	1480	0.4	419	296	1790	0.4	530	347	1390	0.4	385	281	1660	0.4	484	327
4-# 9	21	1410	0.5	349	247	1680	0.5	442	289	1310	0.5	321	234	1560	0.5	403	272
2x-2y	25	1320	0.7	209	148	1550	0.7	265	173	1230	0.7	192	140	1430	0.7	242	163
	40	935	0.9	69	49	1010	0.9	88	57	864	0.9	64	46	929	0.9	80	54
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		283	229	6.00	5.40	283	229	6.00	5.40	259	209	6.00	5.40	259	209	6.00	5.40
2.00 %	0	1750	0.0	708	501	2140	0.0	872	576	1650	0.0	657	478	2000	0.0	803	546
Ar(in²)	11	1680	0.2	637	451	2030	0.2	785	519	1580	0.2	591	431	1890	0.2	723	492
= 7.20	13	1650	0.3	557	395	1980	0.3	687	454	1550	0.3	517	377	1850	0.3	633	430
	17	1570	0.4	477	338	1880	0.4	588	389	1480	0.4	443	323	1750	0.4	542	369
12-# 7	21	1490	0.5	398	282	1750	0.5	490	324	1390	0.5	369	269	1630	0.5	452	307
4x-4y	25	1390	0.7	238	169	1610	0.7	294	194	1300	0.7	221	161	1490	0.7	271	184
	40	960	0.9	79	56	1030	0.9	98	64	887	0.9	73	53	942	0.9	90	61
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		283	229	6.00	5.40	283	229	6.00	5.40	258	209	6.00	5.40	258	209	6.00	5.40
2.82 %	0	1850	0.0	825	515	2250	0.0	989	590	1750	0.0	775	492	2100	0.0	921	560
Ar(in²)	11	1770	0.2	743	463	2120	0.2	890	531	1670	0.2	697	443	1980	0.2	829	504
=10.16	13	1730	0.3	650	405	2070	0.3	779	464	1630	0.3	610	387	1930	0.3	725	441
	17	1650	0.4	557	347	1950	0.4	668	398	1560	0.4	523	332	1820	0.4	622	378
8-#10	21	1560	0.5	464	289	1820	0.5	556	332	1460	0.5	436	277	1690	0.5	518	315
4x-2y	25	1450	0.7	278	173	1660	0.7	334	199	1350	0.7	261	166	1540	0.7	311	189
	40	979	0.9	92	57	1040	0.9	111	66	905	0.9	87	55	952	0.9	103	63
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		282	228	6.00	5.40	282	228	6.00	5.40	258	209	6.00	5.40	258	209	6.00	5.40
4.23 %	0	2030	0.0	924	660	2420	0.0	1090	735	1930	0.0	873	638	2280	0.0	1020	705
Ar(in²)	11	1920	0.2	831	594	2270	0.2	979	662	1820	0.2	786	574	2130	0.2	917	634
=15.24	13	1880	0.3	727	520	2220	0.3	856	579	1780	0.3	688	502	2080	0.3	803	555
	17	1790	0.4	623	446	2080	0.4	734	496	1690	0.4	589	430	1950	0.4	688	476
12-#10	21	1670	0.5	519	371	1920	0.5	612	413	1580	0.5	491	358	1800	0.5	573	396
4x-4y	25	1540	0.7	311	223	1750	0.7	367	248	1450	0.7	294	215	1630	0.7	344	238
	40	1010	0.9	103	74	1050	0.9	122	82	930	0.9	98	71	963	0.9	114	79
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		281	228	6.00	5.40	281	228	6.00	5.40	257	208	6.00	5.40	257	208	6.00	5.40

Notes : 1. $Cex = Pex(KxLx)^2/10000.$ (kip-ft²), $Cey = Pey(KyLy)^2/10000.$ (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

φc = 0.85 f'c : 3.0 ksi NW
φb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 18 x 20

Designation		W 10 x 88								W 10 x 77							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.67 %	0	1390	0.0	468	348	1690	0.0	597	409	1290	0.0	423	326	1560	0.0	535	381
Ar(in²)	11	1330	0.2	421	313	1610	0.2	538	368	1230	0.2	380	293	1480	0.2	482	343
= 2.40	13	1300	0.3	368	274	1570	0.3	470	322	1210	0.3	333	256	1450	0.3	422	300
	17	1250	0.4	316	235	1490	0.4	403	276	1160	0.4	285	220	1370	0.4	361	257
4-# 7	21	1180	0.5	263	195	1400	0.5	336	230	1100	0.5	238	183	1280	0.5	301	214
2x-2y	25	1110	0.7	158	117	1290	0.7	201	138	1020	0.7	142	110	1180	0.7	180	128
	40	780	0.9	52	39	839	0.9	67	46	713	0.9	47	36	761	0.9	60	42
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		234	190	6.00	5.40	234	190	6.00	5.40	211	171	6.00	5.40	211	171	6.00	5.40
1.11 %	0	1440	0.0	521	393	1750	0.0	650	454	1340	0.0	475	371	1610	0.0	588	426
Ar(in²)	11	1380	0.2	469	354	1660	0.2	585	409	1280	0.2	428	334	1530	0.2	529	384
= 4.00	13	1350	0.3	410	309	1620	0.3	512	358	1260	0.3	374	292	1490	0.3	463	336
	17	1290	0.4	351	265	1530	0.4	439	307	1200	0.4	321	250	1410	0.4	397	288
4-# 9	21	1220	0.5	293	221	1430	0.5	365	255	1130	0.5	267	208	1310	0.5	331	240
2x-2y	25	1140	0.7	175	132	1320	0.7	219	153	1060	0.7	160	125	1210	0.7	198	144
	40	792	0.9	58	44	846	0.9	73	51	724	0.9	53	41	768	0.9	66	48
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		234	190	6.00	5.40	234	190	6.00	5.40	211	171	6.00	5.40	211	171	6.00	5.40
2.00 %	0	1550	0.0	608	455	1860	0.0	737	517	1450	0.0	562	434	1720	0.0	675	489
Ar(in²)	11	1480	0.2	547	410	1750	0.2	663	465	1380	0.2	506	390	1620	0.2	607	440
= 7.20	13	1450	0.3	478	359	1710	0.3	580	407	1350	0.3	443	341	1580	0.3	531	385
	17	1380	0.4	410	307	1620	0.4	497	349	1290	0.4	379	292	1490	0.4	455	330
12-# 7	21	1300	0.5	342	256	1500	0.5	414	290	1210	0.5	316	244	1380	0.5	379	275
4x-4y	25	1210	0.7	205	153	1370	0.7	248	174	1120	0.7	189	146	1260	0.7	227	165
	40	814	0.9	68	51	858	0.9	82	58	743	0.9	63	48	778	0.9	75	55
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		234	189	6.00	5.40	234	189	6.00	5.40	210	170	6.00	5.40	210	170	6.00	5.40
2.82 %	0	1650	0.0	725	469	1960	0.0	854	530	1550	0.0	680	447	1820	0.0	793	502
Ar(in²)	11	1570	0.2	653	422	1840	0.2	769	477	1470	0.2	612	403	1710	0.2	713	452
=10.16	13	1540	0.3	571	370	1800	0.3	672	417	1440	0.3	535	352	1670	0.3	624	395
	17	1460	0.4	489	317	1690	0.4	576	358	1370	0.4	459	302	1570	0.4	535	339
8-#10	21	1370	0.5	408	264	1560	0.5	480	298	1280	0.5	382	251	1450	0.5	446	282
4x-2y	25	1260	0.7	244	158	1420	0.7	288	179	1170	0.7	229	151	1310	0.7	267	169
	40	830	0.9	81	52	866	0.9	96	59	758	0.9	76	50	785	0.9	89	56
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		233	189	6.00	5.40	233	189	6.00	5.40	210	170	6.00	5.40	210	170	6.00	5.40
4.23 %	0	1820	0.0	824	615	2130	0.0	953	676	1730	0.0	779	593	2000	0.0	891	648
Ar(in²)	11	1720	0.2	742	554	1990	0.2	857	608	1630	0.2	701	534	1860	0.2	802	583
=15.24	13	1680	0.3	649	484	1940	0.3	750	532	1590	0.3	614	467	1810	0.3	702	510
	17	1590	0.4	556	415	1820	0.4	643	456	1500	0.4	526	400	1690	0.4	601	437
12-#10	21	1480	0.5	463	346	1670	0.5	536	380	1390	0.5	438	334	1550	0.5	501	364
4x-4y	25	1350	0.7	278	207	1510	0.7	321	228	1260	0.7	263	200	1390	0.7	300	218
	40	851	0.9	92	69	875	0.9	107	76	775	0.9	87	66	791	0.9	100	72
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		232	188	6.00	5.40	232	188	6.00	5.40	209	169	6.00	5.40	209	169	6.00	5.40

Notes :
1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 18 x 20

Designation		W 10 x 68								W 10 x 60							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.67 %	0	1210	0.0	386	307	1450	0.0	485	358	1140	0.0	354	290	1350	0.0	441	337
Ar(in²)	11	1160	0.2	348	276	1370	0.2	436	322	1090	0.2	319	261	1280	0.2	397	303
= 2.40	13	1140	0.3	304	242	1340	0.3	382	282	1070	0.3	279	228	1250	0.3	347	265
	17	1090	0.4	261	207	1270	0.4	327	241	1020	0.4	239	195	1180	0.4	297	227
4-# 7	21	1030	0.5	217	172	1190	0.5	272	201	961	0.5	199	163	1100	0.5	248	189
2x-2y	25	956	0.7	130	103	1090	0.7	163	120	894	0.7	119	97	1010	0.7	148	113
	40	659	0.9	43	34	699	0.9	54	40	609	0.9	39	32	642	0.9	49	37
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		193	156	6.00	5.40	193	156	6.00	5.40	176	143	6.00	5.40	176	143	6.00	5.40
1.11 %	0	1270	0.0	439	352	1510	0.0	537	403	1200	0.0	407	335	1410	0.0	494	382
Ar(in²)	11	1210	0.2	395	317	1420	0.2	484	363	1140	0.2	366	301	1330	0.2	444	343
= 4.00	13	1190	0.3	345	277	1390	0.3	423	317	1120	0.3	320	264	1300	0.3	389	300
	17	1130	0.4	296	238	1310	0.4	363	272	1060	0.4	275	226	1220	0.4	333	257
4-# 9	21	1060	0.5	247	198	1220	0.5	302	226	999	0.5	229	188	1140	0.5	277	214
2x-2y	25	988	0.7	148	119	1120	0.7	181	136	926	0.7	137	113	1040	0.7	166	128
	40	669	0.9	49	39	705	0.9	60	45	619	0.9	45	37	647	0.9	55	42
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		193	156	6.00	5.40	193	156	6.00	5.40	176	142	6.00	5.40	176	142	6.00	5.40
2.00 %	0	1380	0.0	526	415	1620	0.0	624	465	1310	0.0	494	398	1520	0.0	580	444
Ar(in²)	11	1310	0.2	473	373	1520	0.2	562	419	1240	0.2	445	358	1420	0.2	522	400
= 7.20	13	1280	0.3	414	327	1480	0.3	492	366	1210	0.3	389	313	1390	0.3	457	350
	17	1220	0.4	355	280	1390	0.4	421	314	1150	0.4	333	268	1300	0.4	392	300
12-# 7	21	1140	0.5	296	233	1290	0.5	351	262	1070	0.5	278	223	1200	0.5	326	250
4x-4y	25	1050	0.7	177	140	1180	0.7	210	157	986	0.7	166	134	1090	0.7	196	150
	40	687	0.9	59	46	715	0.9	70	52	634	0.9	55	44	655	0.9	65	50
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		192	156	6.00	5.40	192	156	6.00	5.40	175	142	6.00	5.40	175	142	6.00	5.40
2.82 %	0	1480	0.0	643	429	1720	0.0	742	479	1410	0.0	612	412	1620	0.0	698	458
Ar(in²)	11	1400	0.2	579	386	1610	0.2	668	431	1330	0.2	551	370	1510	0.2	628	412
=10.16	13	1370	0.3	507	337	1570	0.3	584	377	1300	0.3	482	324	1470	0.3	550	361
	17	1290	0.4	434	289	1470	0.4	501	323	1220	0.4	413	278	1380	0.4	471	309
8-#10	21	1200	0.5	362	241	1350	0.5	417	269	1140	0.5	344	231	1260	0.5	392	257
4x-2y	25	1100	0.7	217	144	1220	0.7	250	161	1040	0.7	206	139	1140	0.7	235	154
	40	700	0.9	72	48	720	0.9	83	53	645	0.9	68	46	660	0.9	78	51
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		192	155	6.00	5.40	192	155	6.00	5.40	175	142	6.00	5.40	175	142	6.00	5.40
4.23 %	0	1650	0.0	743	575	1890	0.0	841	625	1580	0.0	712	558	1790	0.0	797	604
Ar(in²)	11	1550	0.2	669	517	1760	0.2	757	562	1480	0.2	641	502	1660	0.2	718	543
=15.24	13	1510	0.3	585	453	1710	0.3	662	492	1440	0.3	560	439	1610	0.3	628	475
	17	1420	0.4	501	388	1590	0.4	567	421	1350	0.4	480	376	1500	0.4	538	407
12-#10	21	1310	0.5	418	323	1450	0.5	473	351	1240	0.5	400	314	1360	0.5	448	339
4x-4y	25	1190	0.7	250	194	1300	0.7	283	210	1120	0.7	240	188	1210	0.7	269	203
	40	714	0.9	83	64	722	0.9	94	70	655	0.9	80	62	659	0.9	89	67
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		191	155	6.00	5.40	191	155	6.00	5.40	174	141	6.00	5.40	174	141	6.00	5.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) — Column Size(b x h): 18 x 20

Designation		W 10 x 54								W 10 x 49							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.67 %	0	1090	0.0	330	276	1280	0.0	407	320	1050	0.0	312	265	1220	0.0	382	306
Ar(in²)	11	1040	0.2	297	248	1210	0.2	367	288	1000	0.2	280	238	1150	0.2	343	275
= 2.40	13	1020	0.3	260	217	1180	0.3	321	252	980	0.3	245	208	1130	0.3	300	241
	17	971	0.4	223	186	1120	0.4	275	216	932	0.4	210	178	1060	0.4	257	206
4-# 7	21	913	0.5	186	155	1040	0.5	229	180	875	0.5	175	149	988	0.5	214	172
2x-2y	25	848	0.7	111	93	951	0.7	137	108	811	0.7	105	89	904	0.7	128	103
	40	571	0.9	37	31	599	0.9	45	36	541	0.9	35	29	565	0.9	42	34
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		164	132	6.00	5.40	164	132	6.00	5.40	154	124	6.00	5.40	154	124	6.00	5.40
1.11 %	0	1150	0.0	383	321	1330	0.0	460	365	1110	0.0	364	310	1280	0.0	434	351
Ar(in²)	11	1090	0.2	345	289	1260	0.2	414	328	1050	0.2	328	279	1200	0.2	391	316
= 4.00	13	1070	0.3	301	253	1230	0.3	362	287	1030	0.3	287	244	1170	0.3	342	276
	17	1010	0.4	258	217	1160	0.4	310	246	974	0.4	246	209	1100	0.4	293	237
4-# 9	21	950	0.5	215	180	1070	0.5	259	205	912	0.5	205	174	1020	0.5	244	197
2x-2y	25	878	0.7	129	108	979	0.7	155	123	841	0.7	123	104	932	0.7	146	118
	40	580	0.9	43	36	604	0.9	51	41	550	0.9	41	34	570	0.9	48	39
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		163	132	6.00	5.40	163	132	6.00	5.40	154	124	6.00	5.40	154	124	6.00	5.40
2.00 %	0	1260	0.0	470	384	1440	0.0	547	427	1220	0.0	451	373	1390	0.0	521	414
Ar(in²)	11	1190	0.2	423	346	1350	0.2	492	385	1150	0.2	406	335	1300	0.2	469	372
= 7.20	13	1160	0.3	370	302	1320	0.3	431	336	1120	0.3	355	293	1260	0.3	410	326
	17	1100	0.4	317	259	1240	0.4	369	288	1060	0.4	304	251	1180	0.4	352	279
12-# 7	21	1020	0.5	264	216	1140	0.5	307	240	983	0.5	254	209	1090	0.5	293	233
4x-4y	25	937	0.7	158	129	1030	0.7	184	144	899	0.7	152	125	983	0.7	176	139
	40	594	0.9	52	43	611	0.9	61	48	562	0.9	50	41	576	0.9	58	46
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		163	132	6.00	5.40	163	132	6.00	5.40	153	124	6.00	5.40	153	124	6.00	5.40
2.82 %	0	1360	0.0	588	398	1550	0.0	665	441	1320	0.0	569	387	1490	0.0	639	428
Ar(in²)	11	1280	0.2	529	358	1440	0.2	598	397	1240	0.2	512	348	1390	0.2	575	385
=10.16	13	1250	0.3	463	313	1400	0.3	523	347	1210	0.3	448	305	1350	0.3	503	337
	17	1170	0.4	396	268	1310	0.4	448	298	1130	0.4	384	261	1250	0.4	431	289
8-#10	21	1090	0.5	330	223	1200	0.5	374	248	1050	0.5	320	217	1150	0.5	359	240
4x-2y	25	988	0.7	198	134	1080	0.7	224	149	949	0.7	192	130	1030	0.7	215	144
	40	603	0.9	66	44	614	0.9	74	49	570	0.9	64	43	577	0.9	71	48
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		162	131	6.00	5.40	162	131	6.00	5.40	153	124	6.00	5.40	153	124	6.00	5.40
4.23 %	0	1530	0.0	688	544	1720	0.0	764	587	1490	0.0	669	533	1660	0.0	738	574
Ar(in²)	11	1430	0.2	619	490	1590	0.2	688	529	1390	0.2	602	480	1530	0.2	665	516
=15.24	13	1390	0.3	542	428	1540	0.3	602	462	1350	0.3	527	420	1490	0.3	581	452
	17	1300	0.4	464	367	1430	0.4	516	396	1250	0.4	452	360	1370	0.4	498	387
12-#10	21	1190	0.5	387	306	1290	0.5	430	330	1150	0.5	376	300	1240	0.5	415	323
4x-4y	25	1070	0.7	232	183	1150	0.7	258	198	1030	0.7	226	180	1100	0.7	249	193
	40	611	0.9	77	61	611	0.9	86	66	574	0.9	75	60	574	0.9	83	64
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		162	131	6.00	5.40	162	131	6.00	5.40	152	123	6.00	5.40	152	123	6.00	5.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 18 x 20

Designation		W 8 x 67								W 8 x 58							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.67 %	0	1210	0.0	358	289	1440	0.0	440	331	1130	0.0	328	273	1330	0.0	398	311
Ar(in²)	11	1150	0.2	322	260	1360	0.2	396	298	1080	0.2	295	246	1260	0.2	358	280
= 2.40	13	1130	0.3	282	228	1330	0.3	346	261	1060	0.3	258	215	1230	0.3	313	245
	17	1080	0.4	241	195	1260	0.4	297	224	1010	0.4	221	184	1160	0.4	268	210
4-# 7	21	1020	0.5	201	163	1180	0.5	247	186	948	0.5	184	153	1080	0.5	223	175
2x-2y	25	948	0.7	120	97	1080	0.7	148	112	881	0.7	110	92	995	0.7	134	105
	40	653	0.9	40	32	692	0.9	49	37	598	0.9	36	30	630	0.9	44	35
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		191	155	6.00	5.40	191	155	6.00	5.40	173	140	6.00	5.40	173	140	6.00	5.40
1.11 %	0	1260	0.0	410	335	1490	0.0	492	376	1180	0.0	380	318	1390	0.0	450	356
Ar(in²)	11	1200	0.2	369	301	1410	0.2	443	339	1130	0.2	342	286	1310	0.2	405	321
= 4.00	13	1180	0.3	323	263	1380	0.3	387	296	1100	0.3	299	250	1280	0.3	354	281
	17	1120	0.4	277	226	1300	0.4	332	254	1050	0.4	256	215	1210	0.4	304	240
4-# 9	21	1060	0.5	231	188	1210	0.5	277	212	985	0.5	214	179	1120	0.5	253	200
2x-2y	25	980	0.7	138	113	1110	0.7	166	127	913	0.7	128	107	1020	0.7	152	120
	40	663	0.9	46	37	698	0.9	55	42	608	0.9	42	35	635	0.9	50	40
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		191	154	6.00	5.40	191	154	6.00	5.40	172	140	6.00	5.40	172	140	6.00	5.40
2.00 %	0	1370	0.0	497	397	1600	0.0	579	439	1290	0.0	467	381	1500	0.0	537	419
Ar(in²)	11	1300	0.2	447	357	1510	0.2	521	395	1220	0.2	420	343	1400	0.2	483	377
= 7.20	13	1270	0.3	391	313	1470	0.3	456	346	1200	0.3	368	300	1370	0.3	423	330
	17	1210	0.4	335	268	1380	0.4	390	296	1130	0.4	315	257	1290	0.4	362	283
12-# 7	21	1130	0.5	279	223	1280	0.5	325	247	1060	0.5	262	214	1190	0.5	302	235
4x-4y	25	1040	0.7	167	134	1170	0.7	195	148	972	0.7	157	128	1080	0.7	181	141
	40	681	0.9	55	44	707	0.9	65	49	623	0.9	52	42	643	0.9	60	47
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		190	154	6.00	5.40	190	154	6.00	5.40	172	139	6.00	5.40	172	139	6.00	5.40
2.82 %	0	1470	0.0	615	411	1710	0.0	696	452	1400	0.0	584	395	1600	0.0	654	433
Ar(in²)	11	1390	0.2	553	370	1600	0.2	626	407	1310	0.2	526	355	1490	0.2	589	390
=10.16	13	1360	0.3	484	324	1560	0.3	548	356	1280	0.3	460	311	1450	0.3	515	341
	17	1280	0.4	415	277	1460	0.4	470	305	1210	0.4	394	266	1360	0.4	442	292
8-#10	21	1200	0.5	346	231	1340	0.5	391	254	1120	0.5	328	222	1250	0.5	368	243
4x-2y	25	1100	0.7	207	138	1210	0.7	235	152	1030	0.7	197	133	1120	0.7	221	146
	40	693	0.9	69	46	713	0.9	78	50	633	0.9	65	44	647	0.9	73	48
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		190	154	6.00	5.40	190	154	6.00	5.40	172	139	6.00	5.40	172	139	6.00	5.40
4.23 %	0	1640	0.0	713	557	1880	0.0	795	598	1570	0.0	683	541	1770	0.0	753	579
Ar(in²)	11	1540	0.2	642	501	1750	0.2	715	538	1470	0.2	615	487	1640	0.2	678	521
=15.24	13	1500	0.3	562	439	1700	0.3	626	471	1430	0.3	538	426	1590	0.3	593	456
	17	1410	0.4	481	376	1580	0.4	536	403	1340	0.4	461	365	1480	0.4	508	390
12-#10	21	1300	0.5	401	313	1440	0.5	447	336	1230	0.5	384	304	1340	0.5	423	325
4x-4y	25	1180	0.7	240	188	1290	0.7	268	201	1110	0.7	230	182	1200	0.7	254	195
	40	706	0.9	80	62	715	0.9	89	67	643	0.9	76	60	646	0.9	84	65
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		189	153	6.00	5.40	189	153	6.00	5.40	171	138	6.00	5.40	171	138	6.00	5.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 18 x 18

Designation		W 14 x 53								W 14 x 48							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.74 %	0	1030	0.0	351	250	1220	0.0	451	280	987	0.0	326	241	1160	0.0	416	270
Ar(in^2)	11	982	0.2	316	225	1150	0.2	406	252	939	0.2	293	217	1090	0.2	374	243
= 2.40	13	964	0.3	277	197	1120	0.3	355	221	921	0.3	256	190	1070	0.3	327	213
	17	919	0.4	237	168	1060	0.4	304	189	877	0.4	220	162	1010	0.4	281	182
4-# 7	21	865	0.5	197	140	988	0.5	253	157	824	0.5	183	135	935	0.5	234	152
2x-2y	25	803	0.7	118	84	906	0.7	152	94	764	0.7	110	81	856	0.7	140	91
	40	545	0.9	39	28	573	0.9	50	31	513	0.9	36	27	537	0.9	46	30
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		151	127	5.89	5.40	151	127	5.89	5.40	139	118	5.85	5.40	139	118	5.85	5.40
.98 %	0	1060	0.0	373	271	1240	0.0	473	302	1010	0.0	348	263	1180	0.0	438	292
Ar(in^2)	11	1010	0.2	336	244	1170	0.2	425	272	963	0.2	313	236	1110	0.2	394	262
= 3.16	13	986	0.3	294	214	1150	0.3	372	238	944	0.3	274	207	1090	0.3	345	230
	17	939	0.4	252	183	1080	0.4	319	204	897	0.4	234	177	1030	0.4	295	197
4-# 8	21	882	0.5	210	152	1010	0.5	266	170	842	0.5	195	147	951	0.5	246	164
2x-2y	25	818	0.7	126	91	920	0.7	159	102	779	0.7	117	88	869	0.7	147	98
	40	549	0.9	42	30	575	0.9	53	34	517	0.9	39	29	539	0.9	49	32
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		151	127	5.89	5.40	151	127	5.89	5.40	139	118	5.85	5.40	139	118	5.85	5.40
1.95 %	0	1170	0.0	436	364	1350	0.0	532	394	1120	0.0	411	355	1290	0.0	498	384
Ar(in^2)	11	1100	0.2	392	328	1270	0.2	479	355	1060	0.2	370	320	1210	0.2	448	346
= 6.32	13	1080	0.3	343	287	1240	0.3	419	310	1040	0.3	324	280	1180	0.3	392	302
	17	1020	0.4	294	246	1160	0.4	359	266	980	0.4	278	240	1100	0.4	336	259
8-# 8	21	954	0.5	245	205	1070	0.5	299	222	913	0.5	231	200	1020	0.5	280	216
2x-4y	25	878	0.7	147	123	973	0.7	179	133	837	0.7	139	120	922	0.7	168	129
	40	565	0.9	49	41	584	0.9	59	44	531	0.9	46	40	546	0.9	56	43
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		151	126	5.89	5.40	151	126	5.89	5.40	138	118	5.85	5.40	138	118	5.85	5.40
2.78 %	0	1260	0.0	528	424	1440	0.0	627	454	1210	0.0	502	415	1380	0.0	592	444
Ar(in^2)	11	1180	0.2	475	382	1350	0.2	564	409	1140	0.2	452	374	1290	0.2	533	400
= 9.00	13	1160	0.3	416	334	1310	0.3	494	358	1110	0.3	396	327	1250	0.3	466	350
	17	1090	0.4	356	286	1230	0.4	423	306	1050	0.4	339	280	1170	0.4	400	300
4-#14	21	1010	0.5	297	238	1130	0.5	353	255	970	0.5	282	233	1070	0.5	333	250
2x-2y	25	925	0.7	178	143	1020	0.7	211	153	884	0.7	169	140	963	0.7	200	150
	40	574	0.9	59	47	587	0.9	70	51	540	0.9	56	46	549	0.9	66	50
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		150	126	5.89	5.40	150	126	5.89	5.40	138	118	5.85	5.40	138	118	5.85	5.40
3.85 %	0	1380	0.0	551	527	1560	0.0	643	557	1330	0.0	527	518	1500	0.0	610	546
Ar(in^2)	11	1290	0.2	496	474	1450	0.2	579	501	1250	0.2	475	466	1390	0.2	549	492
=12.48	13	1260	0.3	434	415	1410	0.3	506	438	1210	0.3	415	408	1350	0.3	481	430
	17	1180	0.4	372	355	1310	0.4	434	375	1130	0.4	356	349	1250	0.4	412	369
8-#11	21	1090	0.5	310	296	1190	0.5	362	313	1040	0.5	296	291	1140	0.5	343	307
2x-4y	25	983	0.7	186	177	1070	0.7	217	187	940	0.7	178	174	1010	0.7	206	184
	40	582	0.9	62	59	587	0.9	72	62	546	0.9	59	58	548	0.9	68	61
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		150	126	5.89	5.40	150	126	5.89	5.40	138	117	5.85	5.40	138	117	5.85	5.40

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 18 x 18

Designation		W 10 x 68								W 10 x 60							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.74 %	0	1160	0.0	359	297	1400	0.0	457	346	1090	0.0	327	280	1300	0.0	413	325
Ar(in²)	11	1110	0.2	323	267	1320	0.2	411	311	1040	0.2	294	252	1230	0.2	372	293
= 2.40	13	1090	0.3	282	234	1290	0.3	360	272	1020	0.3	258	221	1200	0.3	326	256
	17	1040	0.4	242	200	1230	0.4	308	233	974	0.4	221	189	1140	0.4	279	219
4-# 7	21	982	0.5	202	167	1140	0.5	257	194	918	0.5	184	157	1060	0.5	232	183
2x-2y	25	917	0.7	121	100	1050	0.7	154	116	855	0.7	110	94	973	0.7	139	109
	40	636	0.9	40	33	678	0.9	51	38	586	0.9	36	31	621	0.9	46	36
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		152	152	5.40	5.40	152	152	5.40	5.40	138	138	5.40	5.40	138	138	5.40	5.40
.98 %	0	1190	0.0	381	318	1420	0.0	479	367	1120	0.0	349	302	1320	0.0	435	347
Ar(in²)	11	1130	0.2	343	287	1350	0.2	431	331	1060	0.2	314	272	1250	0.2	392	312
= 3.16	13	1110	0.3	300	251	1320	0.3	377	289	1040	0.3	275	238	1220	0.3	343	273
	17	1060	0.4	257	215	1250	0.4	323	248	994	0.4	235	204	1160	0.4	294	234
4-# 8	21	1000	0.5	214	179	1160	0.5	269	206	936	0.5	196	170	1080	0.5	245	195
2x-2y	25	932	0.7	128	107	1070	0.7	161	124	870	0.7	117	102	987	0.7	147	117
	40	641	0.9	42	35	681	0.9	53	41	591	0.9	39	34	624	0.9	49	39
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		152	152	5.40	5.40	152	152	5.40	5.40	138	138	5.40	5.40	138	138	5.40	5.40
1.95 %	0	1290	0.0	440	411	1530	0.0	537	460	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	1230	0.2	396	370	1440	0.2	484	414	0	0.2	0	0	0	0.2	0	0
= 6.32	13	1200	0.3	347	324	1410	0.3	423	362	0	0.3	0	0	0	0.3	0	0
	17	1150	0.4	297	277	1330	0.4	363	310	0	0.4	0	0	0	0.4	0	0
8-# 8	21	1070	0.5	247	231	1230	0.5	302	258	0	0.5	0	0	0	0.5	0	0
2x-4y	25	995	0.7	148	138	1120	0.7	181	155	0	0.7	0	0	0	0.7	0	0
	40	661	0.9	49	46	692	0.9	60	51	0	0.9	0	0	0	0.9	0	0
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		151	151	5.40	5.40	151	151	5.40	5.40	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00
.00 %	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0
Ar(in²)	11	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0	0	0.2	0	0
= .00	13	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0	0	0.3	0	0
	17	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0
0-# 0	21	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0	0	0.5	0	0
0x-0y	25	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0	0	0.7	0	0
	40	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0	0	0.9	0	0
#0 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 0 in		0	0	.00	.00	0	0	.00	.00	0	0	.00	.00	0	0	.00	.00

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 18 x 18

Designation		W 10 x 54								W 10 x 49							
Fy (ksi)		36				50				36				50			
Reinf.	KL	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy	φcPn	Pu/(φcPn)	Mux	Muy
.74 %	0	1040	0.0	303	267	1230	0.0	380	309	996	0.0	284	256	1170	0.0	354	296
Ar(in²)	11	988	0.2	273	240	1160	0.2	342	278	948	0.2	256	231	1100	0.2	319	266
= 2.40	13	969	0.3	239	210	1130	0.3	299	243	930	0.3	224	202	1080	0.3	279	233
	17	924	0.4	204	180	1070	0.4	256	208	885	0.4	192	173	1020	0.4	239	200
4-# 7	21	870	0.5	170	150	996	0.5	214	174	832	0.5	160	144	946	0.5	199	166
2x-2y	25	809	0.7	102	90	913	0.7	128	104	772	0.7	96	86	866	0.7	119	100
	40	549	0.9	34	30	578	0.9	42	34	519	0.9	32	28	544	0.9	39	33
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		128	128	5.40	5.40	128	128	5.40	5.40	120	120	5.40	5.40	120	120	5.40	5.40
.98 %	0	1060	0.0	325	289	1250	0.0	402	331	1020	0.0	306	278	1190	0.0	376	317
Ar(in²)	11	1010	0.2	292	260	1180	0.2	362	297	971	0.2	276	250	1130	0.2	338	286
= 3.16	13	992	0.3	256	227	1150	0.3	316	260	952	0.3	241	219	1100	0.3	296	250
	17	944	0.4	219	195	1090	0.4	271	223	906	0.4	207	187	1040	0.4	254	214
4-# 8	21	888	0.5	183	162	1010	0.5	226	186	850	0.5	172	156	962	0.5	211	178
2x-2y	25	823	0.7	109	97	927	0.7	135	111	787	0.7	103	93	880	0.7	127	107
	40	553	0.9	36	32	580	0.9	45	37	523	0.9	34	31	546	0.9	42	35
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		128	128	5.40	5.40	128	128	5.40	5.40	120	120	5.40	5.40	120	120	5.40	5.40
1.95 %	0	1170	0.0	418	333	1360	0.0	495	374	1130	0.0	400	322	1300	0.0	470	361
Ar(in²)	11	1110	0.2	377	300	1280	0.2	446	337	1070	0.2	360	290	1220	0.2	423	325
= 6.32	13	1090	0.3	329	262	1240	0.3	390	295	1050	0.3	315	254	1190	0.3	370	284
	17	1030	0.4	282	225	1170	0.4	334	253	988	0.4	270	217	1120	0.4	317	244
8-# 8	21	960	0.5	235	187	1080	0.5	278	210	921	0.5	225	181	1030	0.5	264	203
4x-2y	25	883	0.7	141	112	980	0.7	167	126	846	0.7	135	108	932	0.7	158	122
	40	569	0.9	47	37	589	0.9	55	42	538	0.9	45	36	554	0.9	52	40
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		128	128	5.40	5.40	128	128	5.40	5.40	120	120	5.40	5.40	120	120	5.40	5.40
2.93 %	0	1280	0.0	479	426	1470	0.0	555	467	1240	0.0	461	415	1410	0.0	529	454
Ar(in²)	11	1200	0.2	431	383	1370	0.2	499	420	1160	0.2	415	374	1310	0.2	476	409
= 9.48	13	1180	0.3	377	335	1330	0.3	437	368	1140	0.3	363	327	1280	0.3	417	357
	17	1110	0.4	323	287	1250	0.4	374	315	1070	0.4	311	280	1190	0.4	357	306
12-# 8	21	1030	0.5	269	239	1140	0.5	312	263	989	0.5	259	233	1090	0.5	298	255
4x-4y	25	939	0.7	161	143	1030	0.7	187	157	900	0.7	155	140	981	0.7	178	153
	40	580	0.9	53	47	593	0.9	62	52	548	0.9	51	46	557	0.9	59	51
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		127	127	5.40	5.40	127	127	5.40	5.40	119	119	5.40	5.40	119	119	5.40	5.40
3.85 %	0	1380	0.0	500	544	1570	0.0	572	586	1340	0.0	483	534	1510	0.0	548	573
Ar(in²)	11	1290	0.2	450	490	1460	0.2	515	527	1250	0.2	434	480	1400	0.2	493	515
=12.48	13	1260	0.3	394	429	1420	0.3	450	461	1220	0.3	380	420	1360	0.3	431	451
	17	1180	0.4	337	367	1320	0.4	386	395	1140	0.4	326	360	1260	0.4	370	386
8-#11	21	1090	0.5	281	306	1200	0.5	321	329	1050	0.5	271	300	1150	0.5	308	322
2x-4y	25	989	0.7	168	183	1070	0.7	193	197	948	0.7	163	180	1020	0.7	185	193
	40	587	0.9	56	61	593	0.9	64	65	553	0.9	54	60	556	0.9	61	64
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		127	127	5.40	5.40	127	127	5.40	5.40	119	119	5.40	5.40	119	119	5.40	5.40

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for φcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = φbMnx and Muy = φbMny when Pu/(φcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

$\phi c = 0.85$ f'c : 3.0 ksi NW
$\phi b = 0.90$ Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 18 x 18

Designation		W 10 x 45								W							
Fy (ksi)		36				50											
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy								
.74 %	0	964	0.0	270	237	1120	0.0	335	268								
Ar(in²)	11	917	0.2	243	213	1060	0.2	301	241								
= 2.40	13	899	0.3	213	187	1030	0.3	263	211								
	17	855	0.4	182	160	976	0.4	226	180								
4-# 7	21	802	0.5	152	133	907	0.5	188	150								
2x-2y	25	743	0.7	91	80	829	0.7	113	90								
	40	496	0.9	30	26	518	0.9	37	30								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		114	114	5.40	5.40	114	114	5.40	5.40								
.98 %	0	990	0.0	292	259	1150	0.0	356	289								
Ar(in²)	11	940	0.2	263	233	1080	0.2	321	260								
= 3.16	13	921	0.3	230	204	1060	0.3	281	228								
	17	875	0.4	197	175	995	0.4	240	195								
4-# 8	21	820	0.5	164	145	923	0.5	200	162								
2x-2y	25	758	0.7	98	87	842	0.7	120	97								
	40	500	0.9	32	29	520	0.9	40	32								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		114	114	5.40	5.40	114	114	5.40	5.40								
1.95 %	0	1100	0.0	386	303	1260	0.0	450	333								
Ar(in²)	11	1040	0.2	347	273	1180	0.2	405	300								
= 6.32	13	1010	0.3	304	238	1150	0.3	354	262								
	17	957	0.4	260	204	1070	0.4	304	225								
8-# 8	21	890	0.5	217	170	988	0.5	253	187								
4x-2y	25	816	0.7	130	102	894	0.7	152	112								
	40	513	0.9	43	34	526	0.9	50	37								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		113	113	5.40	5.40	113	113	5.40	5.40								
2.93 %	0	1210	0.0	447	396	1360	0.0	510	426								
Ar(in²)	11	1130	0.2	402	356	1270	0.2	459	383								
= 9.48	13	1100	0.3	352	312	1230	0.3	401	335								
	17	1040	0.4	301	267	1150	0.4	344	287								
12-# 8	21	957	0.5	251	222	1050	0.5	286	239								
4x-4y	25	869	0.7	150	133	942	0.7	172	143								
	40	522	0.9	50	44	528	0.9	57	47								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		113	113	5.40	5.40	113	113	5.40	5.40								
3.85 %	0	1310	0.0	469	514	1470	0.0	528	544								
Ar(in²)	11	1220	0.2	422	463	1360	0.2	475	490								
=12.48	13	1190	0.3	369	405	1320	0.3	416	429								
	17	1110	0.4	316	347	1220	0.4	356	367								
8-#11	21	1020	0.5	263	289	1110	0.5	297	306								
2x-4y	25	916	0.7	158	173	984	0.7	178	183								
	40	526	0.9	52	57	527	0.9	59	61								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		113	113	5.40	5.40	113	113	5.40	5.40								

Notes : 1. Cex = Pex(KxLx)²/10000. (kip-ft²), Cey = Pey(KyLy)²/10000. (kip-ft²), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90 Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips) Column Size(b x h): 18 x 18

Designation		W 8 x 67								W 8 x 58							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.74 %	0	1150	0.0	328	279	1380	0.0	409	319	1070	0.0	298	263	1280	0.0	367	300
Ar(in^2)	11	1100	0.2	295	251	1310	0.2	368	287	1030	0.2	268	237	1210	0.2	331	270
= 2.40	13	1080	0.3	258	219	1280	0.3	322	251	1010	0.3	234	207	1180	0.3	289	236
	17	1030	0.4	221	188	1220	0.4	276	215	960	0.4	201	177	1120	0.4	248	202
4-# 7	21	974	0.5	184	157	1130	0.5	230	179	905	0.5	167	148	1040	0.5	206	168
2x-2y	25	909	0.7	110	94	1040	0.7	138	107	842	0.7	100	88	957	0.7	124	101
	40	630	0.9	36	31	671	0.9	46	35	576	0.9	33	29	609	0.9	41	33
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		150	150	5.40	5.40	150	150	5.40	5.40	135	135	5.40	5.40	135	135	5.40	5.40
.98 %	0	1180	0.0	350	300	1410	0.0	431	341	1100	0.0	320	285	1300	0.0	389	321
Ar(in^2)	11	1120	0.2	315	270	1330	0.2	388	306	1050	0.2	288	256	1230	0.2	350	289
= 3.16	13	1100	0.3	275	236	1300	0.3	339	268	1030	0.3	252	224	1200	0.3	306	253
	17	1050	0.4	236	203	1230	0.4	291	230	980	0.4	216	192	1140	0.4	263	217
4-# 8	21	992	0.5	196	169	1150	0.5	242	191	923	0.5	180	160	1060	0.5	219	180
2x-2y	25	924	0.7	118	101	1060	0.7	145	115	857	0.7	108	96	970	0.7	131	108
	40	635	0.9	39	33	674	0.9	48	38	581	0.9	36	32	612	0.9	43	36
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		150	150	5.40	5.40	150	150	5.40	5.40	135	135	5.40	5.40	135	135	5.40	5.40
1.95 %	0	1280	0.0	443	344	1520	0.0	524	384	1210	0.0	413	329	1410	0.0	483	365
Ar(in^2)	11	1220	0.2	399	310	1430	0.2	472	346	1150	0.2	372	296	1330	0.2	434	328
= 6.32	13	1200	0.3	349	271	1400	0.3	413	303	1120	0.3	325	259	1290	0.3	380	287
	17	1140	0.4	299	232	1320	0.4	354	259	1060	0.4	279	222	1220	0.4	326	246
8-# 8	21	1070	0.5	249	193	1220	0.5	295	216	995	0.5	232	185	1130	0.5	271	205
4x-2y	25	987	0.7	149	116	1110	0.7	177	129	918	0.7	139	111	1020	0.7	163	123
	40	654	0.9	49	38	684	0.9	59	43	598	0.9	46	37	621	0.9	54	41
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		150	150	5.40	5.40	150	150	5.40	5.40	135	135	5.40	5.40	135	135	5.40	5.40
2.93 %	0	1390	0.0	502	437	1630	0.0	583	477	1320	0.0	472	421	1520	0.0	541	457
Ar(in^2)	11	1320	0.2	451	393	1520	0.2	524	429	1240	0.2	424	379	1420	0.2	487	412
= 9.48	13	1290	0.3	395	344	1490	0.3	459	375	1210	0.3	371	332	1380	0.3	426	360
	17	1220	0.4	338	295	1390	0.4	393	322	1150	0.4	318	284	1300	0.4	365	309
12-# 8	21	1140	0.5	282	245	1290	0.5	328	268	1070	0.5	265	237	1190	0.5	304	257
4x-4y	25	1050	0.7	169	147	1160	0.7	196	161	975	0.7	159	142	1080	0.7	182	154
	40	669	0.9	56	49	691	0.9	65	53	610	0.9	53	47	626	0.9	60	51
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		149	149	5.40	5.40	149	149	5.40	5.40	135	135	5.40	5.40	135	135	5.40	5.40
3.85 %	0	1490	0.0	607	458	1730	0.0	688	498	1420	0.0	577	443	1620	0.0	646	479
Ar(in^2)	11	1410	0.2	546	413	1610	0.2	619	448	1330	0.2	519	399	1510	0.2	582	431
=12.48	13	1380	0.3	478	361	1570	0.3	542	392	1300	0.3	454	349	1470	0.3	509	377
	17	1300	0.4	409	309	1470	0.4	464	336	1220	0.4	389	299	1370	0.4	436	323
8-#11	21	1200	0.5	341	258	1350	0.5	387	280	1130	0.5	324	249	1250	0.5	363	269
4x-2y	25	1100	0.7	204	154	1210	0.7	232	168	1030	0.7	194	149	1120	0.7	218	161
	40	679	0.9	68	51	694	0.9	77	56	618	0.9	64	49	627	0.9	72	53
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		149	149	5.40	5.40	149	149	5.40	5.40	134	134	5.40	5.40	134	134	5.40	5.40

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85   f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips), Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 18 x 18

Designation		W 8 x 48								W							
Fy (ksi)		36				50											
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy								
.74 %	0	987	0.0	264	244	1160	0.0	321	277								
Ar(in^2)	11	939	0.2	238	220	1090	0.2	289	249								
= 2.40	13	921	0.3	208	192	1070	0.3	253	218								
	17	877	0.4	178	165	1010	0.4	217	187								
4-# 7	21	824	0.5	148	137	935	0.5	180	155								
2x-2y	25	764	0.7	89	82	856	0.7	108	93								
	40	513	0.9	29	27	537	0.9	36	31								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		118	118	5.40	5.40	118	118	5.40	5.40								
.98 %	0	1010	0.0	286	266	1180	0.0	343	298								
Ar(in^2)	11	963	0.2	257	239	1110	0.2	309	269								
= 3.16	13	944	0.3	225	209	1090	0.3	270	235								
	17	897	0.4	193	179	1030	0.4	231	201								
4-# 8	21	842	0.5	161	149	951	0.5	193	168								
2x-2y	25	779	0.7	96	89	869	0.7	115	100								
	40	517	0.9	32	29	539	0.9	38	33								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		118	118	5.40	5.40	118	118	5.40	5.40								
1.95 %	0	1120	0.0	379	310	1290	0.0	436	342								
Ar(in^2)	11	1060	0.2	341	279	1210	0.2	393	308								
= 6.32	13	1040	0.3	299	244	1180	0.3	344	270								
	17	980	0.4	256	209	1100	0.4	294	231								
8-# 8	21	913	0.5	213	174	1020	0.5	245	192								
4x-2y	25	837	0.7	128	104	922	0.7	147	115								
	40	531	0.9	42	34	546	0.9	49	38								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		118	118	5.40	5.40	118	118	5.40	5.40								
2.93 %	0	1230	0.0	438	403	1400	0.0	495	435								
Ar(in^2)	11	1160	0.2	394	362	1300	0.2	445	391								
= 9.48	13	1130	0.3	345	317	1270	0.3	390	342								
	17	1060	0.4	296	272	1180	0.4	334	293								
12-# 8	21	980	0.5	246	226	1080	0.5	278	244								
4x-4y	25	892	0.7	148	136	970	0.7	167	146								
	40	541	0.9	49	45	549	0.9	55	48								
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		118	118	5.40	5.40	118	118	5.40	5.40								
3.85 %	0	1330	0.0	543	425	1500	0.0	600	457								
Ar(in^2)	11	1250	0.2	489	382	1390	0.2	540	411								
=12.48	13	1210	0.3	428	335	1350	0.3	472	359								
	17	1130	0.4	367	287	1250	0.4	405	308								
8-#11	21	1040	0.5	305	239	1140	0.5	337	257								
4x-2y	25	940	0.7	183	143	1010	0.7	202	154								
	40	546	0.9	61	47	548	0.9	67	51								
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@ 12 in		117	117	5.40	5.40	117	117	5.40	5.40								

Notes : 1. Cex = Pex$(KxLx)^2$/10000. (kip-ft^2), Cey = Pey$(KyLy)^2$/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.

2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.

3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.

4. Mux = ϕbMnx and Muy = ϕbMny when Pu/(ϕcPn) = 0.0

PART 5: COMPOSITE COLUMN PROGRAM CMPOL

A computer program named CMPOL has been developed to generate composite column design tables as described in Part 4. The program may be used to generate the tables in either LRFD or ASD format. It is available through AISC. For further information and/or to place your software order, call (312)670-2400.

The program is contained on a high quality 5¼-in. diskette or 3½-in. disk in executable form and may be copied to a hard disk. It will run on any IBM compatible computer (PC/XT/AT 286 or 386 or Model PS/2) with at least 512K installed RAM. A math coprocessor is optional.

The input data for CMPOL is all interactive. The procedure for running the program is as follows:

1. Access drive A or go to the subdirectory containing the program if it is located on the hard disk.
2. Set the printer in a condensed mode. This can be done by typing CONDENSE to invoke a batch file named RCOMP.BAT. The batch file automatically uncondenses the printer after the printing is finished.
3. Type CMPOL. A heading will appear on the screen followed by a question as to where the output is to be directed. Enter 2 for printer.
4. Questions will appear on the screen prompting the user to enter the following data:
   - Design Method. Enter 1 for LRFD, 2 for the approximate procedure as used in the LRFD Manual and described in the text to this guide, 3 for ASD.
   - Unbraced Length (ft). Input 7 values of unbraced length desired.
   - Vertical Reinforcing Bar Splice Type. (1 = bearing or mechanical butt splice, 2 = normal lap splice, 3 = tangential lap splice.) This selection impacts the bar positioning for clearance and cover checks.
   - Column Width (in.). Input minimum, maximum, and increment of column width. If the minimum and maximum are equal, then enter the increment as 1 to avoid an error.
   - Column Depth (in.). Input minimum, maximum, and increment of column depth as described above for column width.
   - Concrete strength (ksi). Input minimum, maximum, and increment of 28 day concrete strength f_c' entering the increment of 1 if the minimum and maximum are equal.
   - Concrete Unit Weight (pcf). This value is used in the determination of the modulus of elasticity for concrete.
   - Clear cover to reinforcing steel (in.). Input clear cover to reinforcing steel each direction and clear cover to rolled shape. All three values will normally be 1.5 in.
   - Reinforcing Steel Yield Strength (ksi).
   - Reinforcing Steel Size (integer number). Input minimum and maximum size of vertical reinforcing bars desired.
   - Reinforcing Steel Ratio (decimal number, i.e., 0.01). Input five percentages of reinforcing steel to be analyzed (typically 0.005, 0.01, 0.02, 0.03, 0.04).
   - Beam Clearance, Each Direction (in.). This number defines the clearance at the centerline of the column in each direction which is to be kept clear of vertical bars so that a beam may frame to the embedded rolled shape.
   - Embedded WF Shape. Nominal Depth (in.) Weight (PLF). Input the minimum and maximum W shape size to be included in the tables.
5. Tabular output will be sent to the printer and will be as shown in Appendices C and D. Note that some printers may not print the character "phi" (ϕ)in which case it will appear as an "m." A sample input screen and output are shown on the following pages.

```
Design method (1 = LRFD exact, 2 = LRFD approximate, 3 = ASD)? - - - - - - - - - 1
Input 7 unbraced length (ft) to be analyzed?- - - - - - - - - - - - - - - - - - - - - - - - - 0 11 13 17 21 25 40
Type of splice (1 = bearing, 2 = normal lap, 3 = tangential lap)? - - - - - - - - - - - - 3
Input min., max. & increment of column width (in)? - - - - - - - - - - - - - - - - - - - - 32 32 1
Input min., max. & increment of column depth (in)?- - - - - - - - - - - - - - - - - - - - - 32 32 1
Input min., max. & increment of concrete fc (ksi)? - - - - - - - - - - - - - - - - - - - - - - 3 3 1
Input unit weight of concrete (pcf)? - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 145
Input clear cover CRx, CRy, CRw (in)?- - - - - - - - - - - - - - - - - - - - - - - - - - - - - 1.5 1.5 1.5
Input fy (ksi) of reinforcing steel? - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 60
Input min., max. size of reinforcing steel?- - - - - - - - - - - - - - - - - - - - - - - - - - - - 7 18
Input 5 percentages of reinf. steel to be analyzed? - - - - - - - - - - - - - - - - - - - - - .005 .01 .02 .03 .04
Input beam clearance reqd. in N-S & E-W dir. (in)? - - - - - - - - - - - - - - - - - - - - 5.5 5.5
Input min., max W shape (ND1, ND2, NW2)?-- - - - - - - - - - - - - - - - - - - - - - - - 12 152 12 170

Do you want to run CMPOL again (1 = yes, 0 = no)?- - - - - - - - - - - - - - - - - - - - 0

Stop—program terminated.

C: I READY I CMPOL
```

COMPOSITE BEAM-COLUMN DESIGN CAPACITY - LRFD

ϕc = 0.85 f'c : 3.0 ksi NW
ϕb = 0.90   Fyr : 60 ksi

Axial Load Capacity (kips). Uniaxial Moment Capacity (ft-kips)

Column Size(b x h): 18 x 18

Designation		W8x67								W8x58							
Fy (ksi)		36				50				36				50			
Reinf.	KL	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy	ϕcPn	Pu/(ϕcPn)	Mux	Muy
.74 X	0	1150	0.0	328	279	1380	0.0	409	319	1070	0.0	298	263	1280	0.0	367	300
Ar(in^2)		1100	0.2	295	251	1310	0.2	368	287	1030	0.2	268	237	1210	0.2	331	270
= 2.40	13	1080	0.3	258	219	1280	0.3	322	251	1010	0.3	234	207	1180	0.3	289	236
	17	1030	0.4	221	188	1220	0.4	276	215	960	0.4	201	177	1120	0.4	248	202
4-# 7	21	974	0.5	184	157	1130	0.5	230	179	905	0.5	167	148	1040	0.5	206	168
2x-2y	25	909	0.7	110	94	1040	0.7	138	107	842	0.7	100	88	957	0.7	124	101
	40	630	0.9	36	31	671	0.9	46	35	576	0.9	33	29	609	0.9	41	33
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@12in		150	150	5.40	5.40	150	150	5.40	5.40	135	135	5.40	5.40	135	135	5.40	5.40
.98 X		1180	0.0	350	300	1410	0.0	431	341	1100	0.0	320	285	1300	0.0	389	321
Ar(in^2)	11	1120	0.2	315	270	1330	0.2	388	306	1050	0.2	288	256	1230	0.2	350	289
=3.16		1100	0.3	275	236	1300	0.3	339	268	1030	0.3	252	224	1200	0.3	306	253
	17	1050	0.4	236	203	1230	0.4	291	230	980	0.4	216	192	1140	0.4	263	217
4-# 8	21	992	0.5	196	169	1150	0.5	242	191	923	0.5	180	160	1060	0.5	219	180
2x-2y	25	924	0.7	118	101	1060	0.7	145	115	857	0.7	108	96	970	0.7	131	108
	40	635	0.9	39	33	674	0.9	48	38	581	0.9	36	32	612	0.9	43	36
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@12in		150	150	5.40	5.40	150	150	5.40	5.40	135	135	5.40	5.40	135	135	5.40	5.40
1.95 X	0	1280	0.0	443	344	1520	0.0	524	384	1210	0.0	413	329	1410	0.0	483	365
Ar(in^2)	11	1220	0.2	399	310	1430	0.2	472	346	1150	0.2	372	296	1330	0.2	434	328
- 6.32	13	1200	0.3	349	271	1400	0.3	413	303	1120	0.3	325	259	1290	0.3	380	287
	17	1140	0.4	299	232	1320	0.4	354	259	1060	0.4	279	222	1220	0.4	326	246
8-# 8	21	1070	0.5	249	193	1220	0.5	295	216	995	0.5	232	185	1130	0.5	271	205
4x-2y	25	987	0.7	149	116	1110	0.7	177	129	918	0.7	139	111	1020	0.7	163	123
	40	654	0.9	49	38	684	0.9	59	43	598	0.9	46	37	621	0.9	54	41
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@12in		150	150	5.40	5.40	150	150	5.40	5.40	135	135	5.40	5.40	135	135	5.40	5.40
2.93 X	0	1390	0.0	502	437	1630	0.0	583	477	1320	0.0	472	421	1520	0.0	541	457
Ar(in^2)	11	1320	0.2	451	393	1520	0.2	524	429	1240	0.2	424	379	1420	0.2	487	412
=9.48	13	1290	0.3	395	344	1490	0.3	459	375	1210	0.3	371	332	1380	0.3	426	360
	17	1220	0.4	338	295	1390	0.4	393	322	1150	0.4	318	284	1300	0.4	365	309
12-# 8	21	1140	0.5	282	245	1290	0.5	328	268	1070	0.5	265	237	1190	0.5	304	257
4x-4y	25	1050	0.7	169	147	1160	0.7	196	161	975	0.7	159	142	1080	0.7	182	154
	40	669	0.9	56	49	691	0.9	65	53	610	0.9	53	47	626	0.9	60	51
#3 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@12in		149	149	5.40	5.40	149	149	5.40	5.40	135	135	5.40	5.40	135	135	5.40	5.40
3.85 X	0	1490	0.0	607	458	1730	0.0	688	498	1420	0.0	577	443	1620	0.0	646	479
Ar(in^2)	11	1410	0.2	546	413	1610	0.2	619	448	1330	0.2	519	399	1510	0.2	582	431
=12.48	13	1380	0.3	478	361	1570	0.3	542	392	1300	0.3	454	349	1470	0.3	509	377
	17	1300	0.4	409	309	1470	0.4	464	336	1220	0.4	389	299	1370	0.4	436	323
8-#11	21	1200	0.5	341	258	1350	0.5	387	280	1130	0.5	324	249	1250	0.5	363	269
4x-2y	25	1100	0.7	204	154	1210	0.7	232	168	1030	0.7	194	149	1120	0.7	218	161
	40	679	0.9	68	51	694	0.9	77	56	618	0.9	64	49	627	0.9	72	53
#4 Ties		Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy	Cex	Cey	rmx	rmy
@12in		149	149	5.40	5.40	149	149	5.40	5.40	134	134	5.40	5.40	134	134	5.40	5.40

Notes : 1. Cex = Pex(KxLx)^2/10000. (kip-ft^2), Cey = Pey(KyLy)^2/10000. (kip-ft^2), KL in ft, rmx & rmy in inches.
2. Zeroes in columns for ϕcPn, Mux, and Muy indicate that no suitable reinforcing bar arrangement is available for the indicated steel percentage.
3. See Figure 2 for definition of bar arrangement (nx-my). NW = Normal wt. concrete.
4. Mux ϕbMnx and Muy ϕbMny when Pu/(ϕcPn) * 0.0

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Revisions and Errata List
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The following list represents corrections to the first printing of AISC Design Guide 6, *Load and Resistance Factor Design of W-Shapes Encased in Concrete.*

Page(s)	Item
5	In the middle of the right column, the equation for u, the "average ultimate bond stress, psi," should have the coefficient "0.09" rather than "0.9" in front of f'_c. It should read: $u = 0.9(0.09 f'_c - 95)$, average ultimate bond stress, psi