NEW YORK CITY
COLLEGE OF TECHNOLOGY
THE CITY UNIVERSITY OF NEW YORK

DEPARTMENT OF ARCHITECTURAL TECHNOLOGY

ARCH 2431 BUILDING TECH III **STEEL CONNECTIONS STUDY ASSIGNMENT 05**

Steel Connections Study:

Based on Building Construction Illustrated: 3rd Edition: Frank Ching: Page 7.24. (See attached) This assignment will focus on the nature of structural connections that can be made using steel columns, beams, and angles that support concrete slabs on metal decks. The goal is to recreate the page including all steel pieces, assembled in place, with annotation and dimensions, formatted on titleblocks. The project will be completed in several stages.

Note: *Multiple coordinated views (plan/front elevation, side elevation or section) are typically the same scale. At times we use a smaller scale for the isometric in order to fit it on the same sheet. Views must be clearly readable.*

Stage 1: *Start the project by creating two 3D families one for the Steel Column and one for the Primary Steel Beam and compose these together in a project file. (See reference sheet for sizes) Create a 22 x 34" sheet and format an isometric view that matches the steel connections page. After you create the Isometric view, create the three coordinated views that are always part of our detail studies (plan, front elevation and side elevation or section – all at the same scale). Try to work at ½" or ¾" scale – we will adjust as needed when we begin sheet layouts)*

Stage 2: *Add additional 3D families for the different steel components shown in the illustration. Select a set of related components and produce a callout at 1 ½" or 3" and create a second sheet that includes a minimum of 4 views, an isometric, plan, front elevation and side elevation or section – all at the same scale) You will create several of these sheets – with the minimum acceptable is one sheet of enlarged details.*

Stage 3: *Add annotation information to your drawings – both notes with leaders and dimensions. Reference Ching*

Research: *You must complete research as part of this assignment. When you have chosen a particular set of steel components to build and study you must research these items. Locate photographs that describe them clearly from a catalogue and find photographs of these used in construction. Look to understand and explain the role they play in the photographs you find.*

Creation of 3D families: *We will review the creation of 3D families in Revit in class. They will be created with the use of reference planes as well as instance parameters so they can be modified in the project file. It is important that they be logically named. All of your families must be prefixed with your name or initials.*

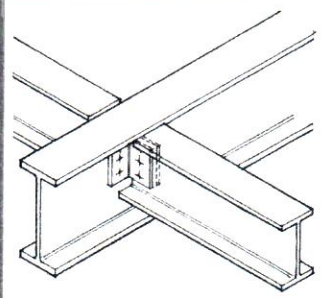
Grading: Criteria for grading will include but not be limited to the following
(Remember quality is more important that quantity)

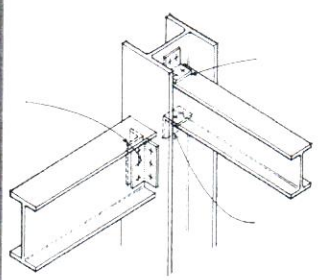
- ***A minimum of two sheets are required, one overall composition and one detail composition***
- ***How well are the drawings composed?***
- ***Are the proper views included? (Multiple coordinated views and an isometric) at a minimum***
- ***Are appropriate annotation and dimensions included?***
- ***Are the Revit Files well-constructed?***

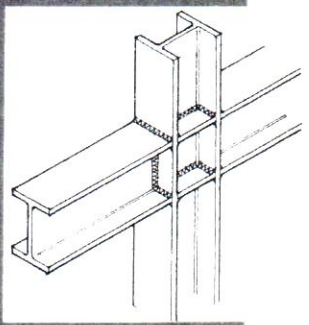
- ***Are the details well researched? Format your research on 11 x 17 landscape format sheets***
- ***Does the student demonstrate an understanding of what has been drawn graphically and verbally?***

- ***Were the drawings plotted correctly and in a single PDF? Does PDF include research?***
- ***Were all files uploaded on time? (Project file and PDF file) Families are contained with the project file.***

BUILDING CONSTRUCTION ILLUSTRATED





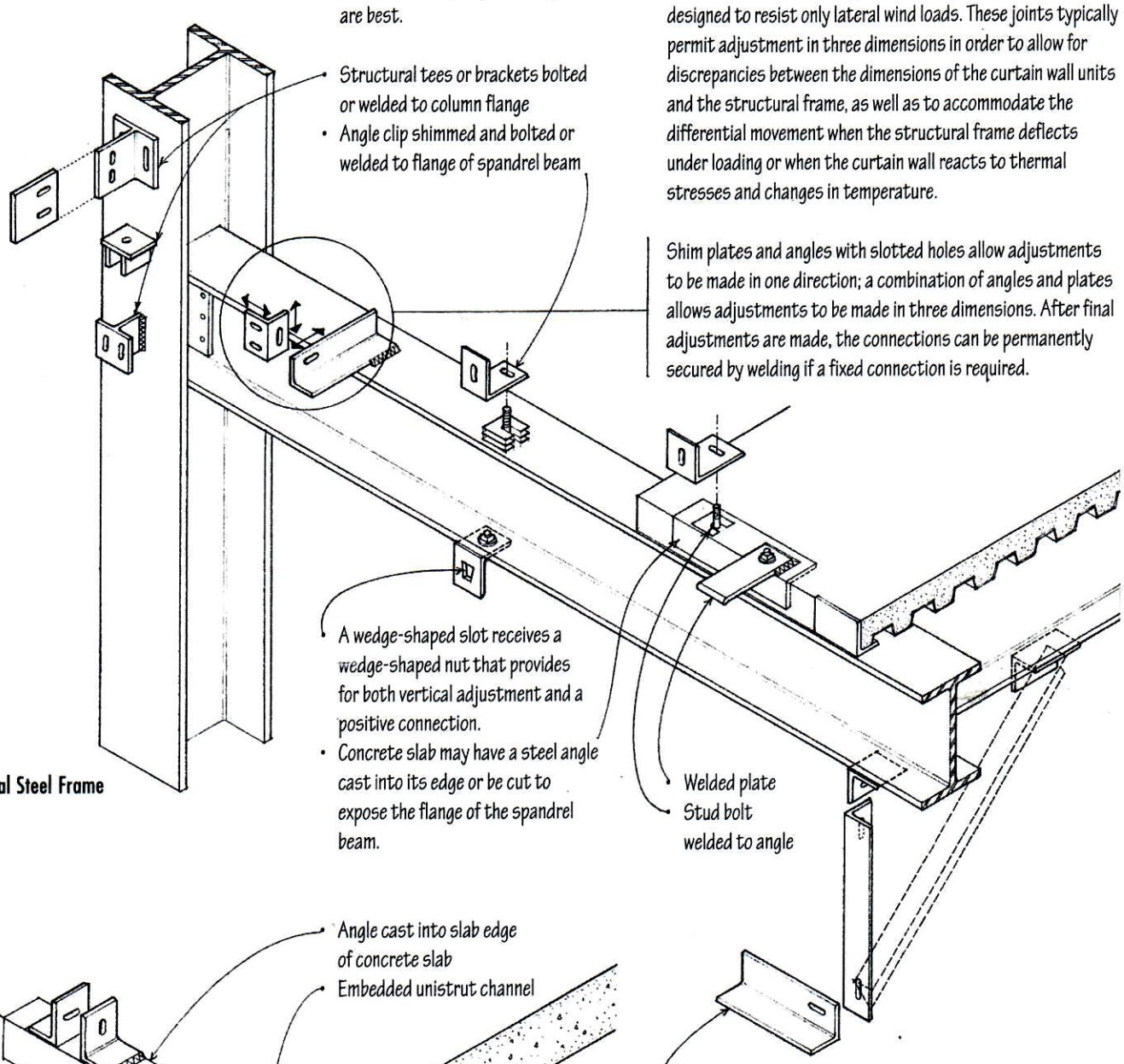


THIRD EDITION

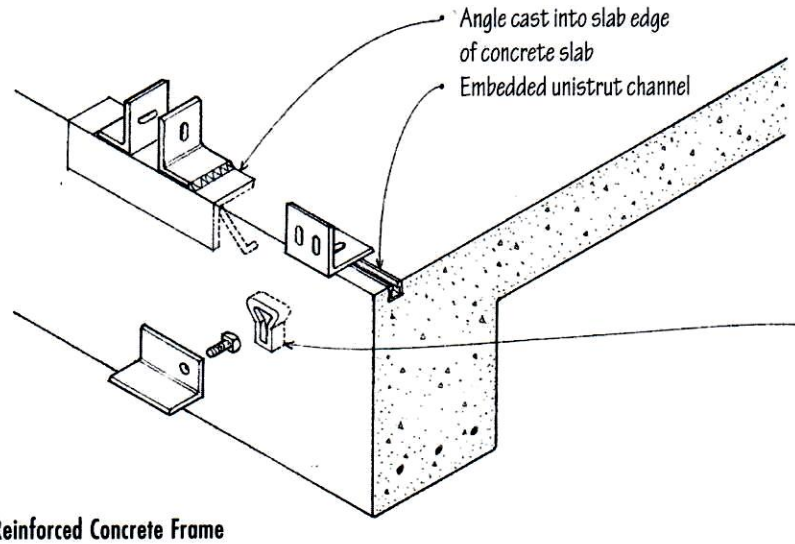
FRANCIS D.K. CHING
and CASSANDRA ADAMS

Any of various metal devices may be used to secure a curtain wall to the structural frame of a building. Some connections are fixed to resist loads applied from any direction. Others are designed to resist only lateral wind loads. These joints typically permit adjustment in three dimensions in order to allow for discrepancies between the dimensions of the curtain wall units and the structural frame, as well as to accommodate the differential movement when the structural frame deflects under loading or when the curtain wall reacts to thermal stresses and changes in temperature.

Shim plates and angles with slotted holes allow adjustments to be made in one direction; a combination of angles and plates allows adjustments to be made in three dimensions. After final adjustments are made, the connections can be permanently secured by welding if a fixed connection is required.



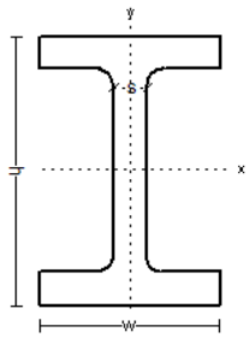
Structural Steel Frame



Reinforced Concrete Frame

American Wide Flange Beams - W Beam

Dimensions of American Wide Flange Beams ASTM A6 - Imperial units



Properties in imperial units of American Wide Flange Beams according ASTM A6 are indicated below.

- American Wide Flange Beams according ASTM A6 - **Metric units**

For the Column use W 24 x 162 and for the Beam use @ 21 x 62

Designation	Dimensions						Static Parameters			
							Moment of Inertia		Elastic Section Modulus	
Imperial *(in x lb/ft)*	Depth h *(in)*	Width w *(in)*	Web Thickness t_w *(in)*	Flange Thickness t_f *(in)*	Sectional Area *(in^2)*	Weight *(lb/ft)*	I_x *(in^4)*	I_y *(in^4)*	W_x *(in^3)*	W_y *(in^3)*
W 27 x 178	27.8	14.09	0.725	1.190	52.3	178	6990	555	502	78.8
W 27 x 161	27.6	14.02	0.660	1.080	47.4	161	6280	497	455	70.9
W 27 x 146	27.4	14	0.605	0.975	42.9	146	5630	443	411	63.5
W 27 x 114	27.3	10.07	0.570	0.930	33.5	114	4090	159	299	31.5
W 27 x 102	27.1	10.02	0.515	0.830	30.0	102	3620	139	267	27.8
W 27 x 94	26.9	10	0.490	0.745	27.7	94	3270	124	243	24.8
W 27 x 84	26.7	9.96	0.460	0.640	24.8	84	2850	106	213	21.2
W 24 x 162	25	13	0.705	1.220	47.7	162	5170	443	414	68.4
W 24 x 146	24.7	12.9	0.650	1.090	43.0	146	4580	391	371	60.5
W 24 x 131	24.5	12.9	0.605	0.960	38.5	131	4020	340	329	53.0
W 24 x 117	24.3	12.8	0.55	0.850	34.4	117	3540	297	291	46.5
W 24 x 104	24.1	12.75	0.500	0.750	30.6	104	3100	259	258	40.7
W 24 x 94	24.1	9.07	0.515	0.875	27.7	94	2700	109	222	24.0
W 24 x 84	24.1	9.02	0.470	0.770	24.7	84	2370	94.4	196	20.9
W 24 x 76	23.9	9	0.440	0.680	22.4	76	2100	82.5	176	18.4
W 24 x 68	23.7	8.97	0.415	0.585	20.1	68	1830	70.4	154	15.7
W 24 x 62	23.7	7.04	0.430	0.590	18.2	62	1550	34.5	131	9.8
W 24 x 55	23.6	7.01	0.395	0.505	16.2	55	1350	29.1	114	8.3
W 21 x 147	22.1	12.51	0.720	1.150	43.2	147	3630	376	329	60.1
W 21 x 132	21.8	12.44	0.650	1.035	38.8	132	3220	333	295	53.5
W 21 x 122	21.7	12.39	0.600	0.960	35.9	122	2960	305	273	49.2
W 21 x 111	21.5	12.34	0.550	0.875	32.7	111	2670	274	249	44.5
W 21 x 101	21.4	12.29	0.500	0.800	29.8	101	2420	248	227	40.3
W 21 x 93	21.6	8.42	0.580	0.930	27.3	93	2070	92.9	192	22.1
W 21 x 83	21.4	8.36	0.515	0.835	24.3	83	1830	81.4	171	19.5
W 21 x 73	21.2	8.3	0.455	0.740	21.5	73	1600	70.6	151	17.0
W 21 x 68	21.1	8.27	0.430	0.685	20.0	68	1480	64.7	140	15.7
W 21 x 62	21	8.24	0.400	0.615	18.3	62	1330	57.5	127	13.9
W 21 x 57	21.1	6.56	0.405	0.650	16.7	57	1170	30.6	111	9.4
W 21 x 50	20.8	6.53	0.380	0.535	14.7	50	984	24.9	94.5	7.6
W 21 x 44	20.7	6.5	0.350	0.450	13.0	44	843	20.7	81.6	6.4

Source of Information: https://www.engineeringtoolbox.com/american-wide-flange-steel-beams-d_1319.html

Additional Reference for steel components: http://products.anssteel.com/category/steel?