# Sheridan Architecture



## Exercise 12: Office/Warehouse roof steel quantity take-off

**Structural Steel Framing** 



- Extracting the data a.
- Sorting by Steel members and elements b.
- Adding column headers С.
- Adding formulas d.
- Adding the Misc. steel estimate e.
- Calculating the deck f.

## Contents of this presentation



- You MUST hand in exercise 12 as a zip file with all the necessary files included.
- o Your extracted data will be checked against the exercise 12 data in the assembled drawing – it must match.
- If you do not hand in the exercise12 files, the data extraction (dxe) template file, and the final excel file, this exercise will not be marked.

## Warning

- You MUST hand in exercise 12 as a zip file with all the necessary files included.
- Your extracted data will be checked against the exercise 12 data in the assembled drawing – it must match.
- If you do not hand in the exercise12 files, the data extraction (dxe) template file, and the final excel file, this exercise will not be marked.

## Warning again

### • The completed task 7 (ready for plotting) is shown.



## Extracting the data

• Make sure that all the layers containing attributes or blocks are NOT frozen.



## Extracting the data



## Extracting the data

🗛 Data Extraction - Define Data Source (Page 2 of 8)				— <b>D X</b>		
Data source					U ZNI	
Drawings/Sheet set						
✓ Include current drawing						
O Select objects in the current drawing						
rawing files and folders:						)
Folders Drawings D:\user\Team00-Task 7\2000S02.dwg (Current drawing	Data Extraction - Ar     Extraction settings     Extract objects from     Extract objects from     Include xrefs in blo	dditional Settings n blocks n xrefs ck counts	×	Add Folder Add Drawings Remove	0WSJ1 _ 9 0WSJ1	W250 X 33
	Extract from Objects in model sy All objects in drawi	oace ng OK Cancel	Help			
				Settings		STEEL ANGLE AROUND PERIMETER
			< Back	Next > Cancel		·
			×			х STL ROOF DECK ЗВММ x 0.76 ММ ТН.
			1200×33			

Extracting the data

🔺 D	ata Extraction - Se	elect Objects (P	age 3 of 8)				- 🗆 🗄	×		
Selec Obj	ct the objects to extr jects	ract data from:					Preview	8200		
	Object 🔺	Display Name	•			Туре				
$\square$	BeamData	BeamData				Block				
	BeamData	BeamData				Block				
	gridbubble	gridbubble				Block				
	HSS127x127	HSS127x127				Block		W250 X 33	W250 × 33	
	HSS127x127	HSS127x127				Block				- <sup>\$</sup>
	OWSJData	OWSJData				Block				<mark>1015</mark>
	OWSJData	OWSJData				Block	_			<b>—</b>
									W250 X 33	
									<u></u>	
								owsJ1	W3	
									-2	
									-xi	
									EW	
									—	
Dis	play options		_					,		
	Display all object t	ypes	Display blocks with attributes only	/						
	Display blocks	only	Display objects currently in-use o	nly					STEEL AND AROUND F	
	O Display non-bl	ocks only							DIEW .	
						< Back Ne	ext > Cancel			
				0 0	<u> </u>					CK
			360						2 38MM × 0.76	мм тн.
									<u></u>	
						W250 × 33	W250 × 33	W250 X 33	1	

## Extracting the data

Data Extraction - Select Properties (Page 4 of 8)							
				— L	* 6200	8200	
following properties were found based on the objects you selected	l.						
ct the properties you want to extract.							
lore the right-click menu for additional options.)							
operties				Category filter			
Property   Display Name Category				3D Visualization			
BEAMDEPTH BEAMDEPTH Attribute				Attribute			
BEAMLENGTH BEAMLENGTH Attribute				General	W250 X	33 W250 X 33	
BEAMTYPE BEAMTYPE Attribute				Geometry		<u>1</u>	×45
BEAMWT BEAMWT Attribute							- 10 0
JOISTLENGTH JOISTLENGTH Attribute					, _X	,	<mark>≂.</mark>
JOISTTYPE JOISTTYPE Attribute						w250,x 33	
						1	
						1 <u>ģ</u>	
						1 1	
					X		
						1	
						1	
						1 ŭ	
						E	
						<u>1</u>	
						<u>1</u>	
						1	
						STEEL ANGL	EI
						AROUND PE	RIMETER
						<u>1 _ Ž</u>	
			< Back	Next > Can		1	
			< Duck	Can			
		l _	š	×	× via	STL ROOF DECH	с им тн
			<u>iš</u> — — — — — — — — — — — — — — — — — — —	suz – 🛐 — 🔶 _ owsu		1 S	
				x 33 W250 X 3	3 W250	(33	

## Extracting the data

Count 🔺	Name	BEAMDEPTH	BEAMLENGTH	BEAMTYPE	BEAMWT	JOISTLENGTH	JOISTTYPE				
1	OWSJData					5940	OWSJ1	-			
1	OWSJData					7003	OWSJ2	-			
1	BeamData	250	3000	w	33			-	W050 V 77	W050 V 77	
2	BeamData	360	7800	w	51				W250/X33		
2	BeamData	310	8200	w	39					<sup>1</sup> 2	2
4	OWSJData					6200	OWSJ2				
9	BeamData	310	3800	w	45				- <u></u>		
10	BeamData	250	6200	W	33				A gwsJ1		
12	OWSJData					6473	OWSJ1			X 45	
12	BeamData	310	6200	w	45				<u></u>	1	
14	OWSJData					8200	OWSJ2				
17	OWSJData					5967	OWSJ2		<u></u>		
37	OWSJData					6200	OWSJ1				
] Combine identic ] Show count colu ] Show name colu	al rows mn mn	-	-			-	⊗ Link Ext 2↓ Sort Colu 100 Full Prev	ernal Data umns Options /iew	0#5J1 0#5J1 0#5J1 0#5J1 0#5J1	STEEL ANGLE AROUND PERIME	
		Mai				41 	Back Next :	> Cancel		<sup>2</sup> 2	

## Extracting the data

CADD12384

move the name lumn. arrange the lumns. rt by amdepth

4	BEAMITTPE	BEAMDEPTH A	BEAMWT	BEAMLENGTH	JOISTTYPE OWSJ2	JOISTLENGTH 6200					
37					OWSJ1	6200					
17					OWSJ2	5967				1	
1					OWSJ1	5940			w250, X 33		
12					OWSJ1	6473				- <u> </u>	0 X 45
14					OWSJ2	8200					W310
1					OWSJ2	7003					
1	w	250	33	3000					owsul		
10	w	250	33	6200						) X 45	
9	W	310	45	3800						w310	
12	W	310	45	6200					OWSJ1		
2	W	310	39	8200					OWSJ1_	<mark>-</mark>	
Combine ide	ntical rows						S Link Extern	al Data	OWSU1OWSU1OWSU1		
Show name of	olumn					< B	G Full Preview ack Next >	Cancel		STEEL AROUN	ANGLE D PERIMETER
						×016W				STL ROOF 38MM × 0.	DECK 76 ММ ТН.

move the name umn. arrange the umns. rt by amdepth



CADD12384

 Output the data to an external file called 20xxS02-\*\*\*
 where xx is your team number and \*\*\*\* is your loginname.

### • Sort the results by joists and beams (beams are already sorted), and then sort the joists.

	A	В	С	D	E	F	G		Н															
1	Count	BEAMTYP	BEAMDE	P BEAMWT	BEAMLEI	VIJOISTTY	PIJOISTLE	NGTH																
2	4					OWSJ2	6200																	
3	37					OWSJ1	6200																	
4	17					OWSJ2	5967																	
5	1					OWSJ1	5940		A	B	C	D	E	F	G	H								
6	12					OWSJ1	6473	1		_							_							
7	14					OWSJ2	8200	2	1. Joi	sts														
8	1					OWSJ2	7003	3	Count	BEAM	TYP BEAMD	EP BEAMWT	BEAMLEN	JOISTTYF	JOISTLENG	STH								
9	1	W	250	33	3000			4		4				OWSJ2	6200									
10	10	W	250	33	6200			5	3	37				OWSJ1	6200		A	В	C	D	E	F	G	H
11	9	W	310	45	3800			6	1	17				OWSJ2	5967	1								
12	12	W	310	45	6200			7		1				OWSJ1	5940	2	1. Jo	oists						
13	2	W	310	39	8200			8	1	12				OWSJ1	6473	3	Count	BEAMTY	PIBEAMD	EP BEAMWT	BEAMLEN	JOISTTYF	JOISTLEN	IGTH
14	2	W	360	51	7800			9	1	14				OWSJ2	8200	4		37				OWSJ1	6200	
10									>	1				OWSJ2	7003	5		1				OWSJ1	5940	
17								11								6		12				OWSJ1	6473	
10								12								7		4				OWSJ2	6200	
10								13	2. Bea	ams						8		17				OWSJ2	5967	
								14						-		9		14				OWSJ2	8200	
								15		1 W	250	33	3000			10		1				OWSJ2	7003	
								16	-	10 W	250	33	6200			11								
								17		9 W	310	45	3800			12								
								18	1	12 W	310	45	6200			13	2. Be	eams						
								19		2 W	310	39	8200			14								
								20		2 W	360	51	7800			15		1 W	250	33	3000			
								21								16		10 W	250	33	6200			
																17		9 W	310	45	3800			
																18		12 W	310	45	6200			
																19		2 W	310	39	8200			
																20		2 W	360	51	7800			
																21								

## Sorting by Steel members and elements



- Add the missing data: OWSJ1 is 14.5 kg/m, and OWSJ2 is 16 kg/m. OWSJ3 (if 0 necessary) is 16 kg/m
- Correct the data warnings: Convert the text to numbers. 0

	A	В	С	D	E	F	G	Н																
1		]																						
2	1. Joist	ts																						
3	Count	BEAMTYP		PREAMWT	BEAMLEN		JOISTLEN	IGTH																
4	37	00,000			DE/ WILLI	OWSJ1	6200						_											
5	1					OWSJ1	5940		A	В	C	D	E	F	G	H								
6	12					OWSJ1	6473																	
7	4					OWSJ2	6200	2	1. Joist	S														
8	17					OWSJ2	5967	3	Count	BEAMTYP	BEAMDER	BEAMWT	BEAMLEN	JOISTTYP	JOISTLEN	GT 🔄	1	A B	С	D	E	F	G	H
9	14					OWSJ2	8200	4	37			14.5		OWSJ1	6200	1								
10	1					OWSJ2	7003	5	1			14.5		OWSJ1	5940	2	1	Joists						
11								6	12			14.5		OWSJ1	6473	3	Cou	nt BEAMTYP	BEAMDEP	BEAMWT B	EAMLEN	JOISTTYP	JOISTLEN	GTH
12								7	4			16		OWSJ2	6200	4		37		14.5		OWSJ1	6200	
13	2 Bear	ne						8	17			16		OWSJ2	5967	5		1		14.5		OWSJ1	5940	
10	<b>2</b> . <b>B</b> oan							9	14			16		OWSJ2	8200	6		12		14.5		OWSJ1	6473	
14								10	1			16		OWSJ2	7003	7		4		16		OWSJ2	6200	
15	1	W	250	33	3000			11								8		17		16		OWSJ2	5967	
16	10	W	250	33	6200			12								9		14		16		OWSJ2	8200	
17	9	W	310	45	3800			13	2. Bean	ıs						10		1		16		OWSJ2	7003	
18	12	W	310	45	6200			14									-							
19	2	W	310	39	8200			15	1	\٨/	250	22	2000			12								
20	2	W	360	51	7800			10	10	WV W/	250	33	6200			13	2. E	Beams						
21								17	9	W	310	45	3800			1.4								
								18	12	W	310	45	6200			14	_	4 10/	050	20	0000			
								19	2	W	310	39	8200			10	_		200	33	3000			
								20	2	W	360	51	7800			10	_	10 VV	250	33	6200			
								21	L	••	000					10		9 VV	310	40	3800			
																10	_		310	40	0200			
																19	-		310	59	7900			
																20		2 VV	500	51	1000			

## Sorting by Steel members and elements

- Type in the correct column headers for the joists and beams.
- Move the joist type and length columns. 0

	A	В	С	D	E	F	G	Н															
1																							
2	1. Joist	s																					
3	Count	BEAMTYE		BEAMWT		JOISTTYP	JOISTI ENGTH		Δ	B	С	D	F F	G	Н								
4	37			14.5		OWSJ1	6200	1								1.00							
5	1			14.5		OWSJ1	5940		1 Ioie	te													
6	12			14.5		OWSJ1	6473		1.0013	ເອ		1		L a marth									
7	4			16		OWSJ2	6200	3	Quantity	,		Linear vve	ight Type	Length		4 A	P	C	D		E	-	
8	17			16		OWSJ2	5967	4	3			14.5	OWSJ1	6200	1	A	D	U	D	E	Г	G	
9	14			16		OWSJ2	8200	- b		\ \		14.5	OWSJ1	5940			• •						
10	1			16		OWSJ2	7003	0	12	2		14.5	OWSJ1	6473	2	1. Jo	oists						
11								- /	4	 7		16	OWSJ2	6200	3	Quant	ty Type		Linear Weight	Length			
12								8	1/			16	OWSJ2	5967	4		37 OWSJ1		14.5	6200			
19	2 Bean	ne						- 9	14	ł		16	OWSJ2	8200	5		1 OWSJ1		14.5	5940			
10	Z. Dean	13						10				16	OvvSJ2	7003	6		12 OWSJ1		14.5	6473			
14								10							- 7		4 OWSJ2		16	6200			
15	1	W	250	33	3000	)		12							8		17 OWSJ2		16	5967			
16	10	W	250	33	6200	)		13	2. Bea	ms					9		14 OWSJ2		16	8200			
17	9	W	310	) 45	3800	)		14	Quantity	Туре	Depth	Linear We	Length		10		1 OWSJ2		16	7003			
18	12	W	310	) 45	6200	)		15	1	W	25	0 33	3000		11	>							
19	2	W	310	) 39	8200	)		16	10	W (	25	0 33	6200		12	_							
20	2	W	360	) 51	7800	)		17	9	W	31	0 45	3800		13	2. B	eams						
21								18	12	2 W	31	0 45	6200		14	Quant	ty Type	Depth	Linear Weight	Length			
								19	2	2 W	31	0 39	8200		15		1 W	250	33	3000			
								20	2	2 W	36	0 51	7800		16		10 W	250	33	6200			
								21							17		9 W	310	45	3800			
															18		12 W	310	45	6200			
															19		2 W	310	39	8200			
															20		2 W	360	51	7800			
															- 21								

### Adding Column Headers



### • The formula for total weight is simple: quantity\*linear weight\*length/1000

1	А	\	В	С	D	E	F	G		H								• Fc	ormat	t the to	tal da	ata to	one	
2	1. J	oists	;															de	ecima	al, and a	add t	he to	tal si	ums
3	Quant	ity T	ype		Linear Weight	Length												fo	r tha	haama	and	inists		
4		37 0	WSJ1		14.5	6200				A	В	С	D	E	F	G		10		Deams	anu	JUISES	•	
Б		1 0	WSJ1		14.5	5940			1															
6		12 0	WSJ1		14.5	6473			2	1 .Joi	ete													
7		4 0	WSJ2		16	6200				Quantity	Typo		Linoar Woight	Longth	Total		_							
8		17 0	WSJ2		16	5967			- 1	Quantity			1/1 5	6200	3326.3									
9		14 0	WSJ2		16	8200			5		1 OWS.11		14.5	5940	86.13		í A	В	С	D	E	F	G	Н
10	_	1 0	WSJ2		16	5 7003			6		12 OWS.11		14.5	6473	1126 302	1	_							
11	_								7		4 OWSJ2		16	6200	396.8	2	1. Jois	sts						
12									8		17 OWSJ2		16	5967	1623.024	3	Quantity	Type		Linear Weight	Length	Total		
13	2. B	eam	S						9		14 OWSJ2		16	8200	1836.8	4	3	7 OWSJ1		14.5	6200	3326.3		
14	Quant	ity T	ype	Depth	Linear Weight	Length			10		1 OWSJ2		16	7003	112.048	5		1 OWSJ1		14.5	5940	86.1		
15		1 V	V	250	33	3000			11							6	1	2 OWSJ1		14.5	6473	1126.3		
16		10 V	V	250	33	6200			12	-						- 7		4 OWSJ2		16	6200	396.8		
17		9 V	V	310	45	3800			13	2 Bea	ams					8	1	7 OWSJ2		16	5967	1623.0		
18		12 V	V	310	45	6200			1.4	Quantity	Type	Dopth	Linear Weight	Longth		9	1	4 OWSJ2		16	8200	1836.8		
19		2 V	V	310	39	8200			15	Quantity	1 W/	250		3000	00	10		1 OWSJ2		16	7003	112.0		
20		2 V	V	360	51	7800			16		10 W	250	33	6200	2046	11								
21									17		9 W	310	45	3800	1539	12						8507.4 kg	J	
									18		12 W	310	45	6200	3348	13	2. Bea	ms						
									19		2 W	310	39	8200	639.6	14	Quantity	Туре	Depth	Linear Weight	Length			
									20		2 W	360	51	7800	795.6	15		1 W	250	33	3000	99.0		
									21							16	1	W 0	250	33	6200	2046.0		
																17	_	9 W	310	45	3800	1539.0		
																18	1	2 W	310	45	6200	3348.0		
																19		2 W	310	39	8200	639.6		
																20		2 W	360	51	7800	795.6		
																21								
																22						8467.2 kg	J	
																- 23								

### Adding Formulas

- There is no standard formula for Misc. Steel (the bridging, steel) 0 plates, connecting rods, perimeter angle etc...)
- Every firm seems to have their own homegrown formulas. 0

	А	В	С	D	E	F	G ł	-								ć		()ne si	oluti	on is ta	h tak	e 5%	ot of	
1																C	9							
2 1	. Joist	s																the to	tal w	veight (	of th	e be	ams	S
3 Q	uantity	Туре		Linear Weight	Length	Total													•	0				
4	37	OWSJ1		14.5	6200	3326.3												and lo	ISTS.					
5	1	OWSJ1		14.5	5 5940	86.1																		
6	12	OWSJ1		14.5	6473	1126.3		A		D	0				<b>E</b> 0									
7	4	OWSJ2		16	6200	396.8	10	A	4	B	U	U	0	E 7000	F G	H	_							
8	17	OWSJ2		16	5967	1623.0	10		10	JVVSJ2		1	6	7003	112.0		_							
9	14	OWSJ2		16	8200	1836.8	10								0507.4		_							
10	1	OWSJ2		16	5 7003	112.0	12								8507.4 Kg			B	C	D	F	F	G	Н
11							13	2. B	eams	S						10		1 0WS12		16	7003	112.0	<u> </u>	
12						8507.4	<b>kg</b> 14	Quant	tity T	ype	Depth	Linear Weight	Ler	ngth		11		1 00002		10	1005	112.0		
13 2	. Bean	ns					15		1 V	V	250	3	33	3000	99.0							8507.4 k	a	
14 Q	uantity	Type	Depth	Linear Weight	Length		16		10 V	V	250	3	33	6200	2046.0	10	28	oame					0	
15	1	W	25	50 33	3 3000	99.0	17		9 V	V	310	4	15	3800	1539.0	10	2.0		Death	Ling on Mainht	L a m aith			
16	10	W	25	50 33	6200	2046.0	18		12 V	V	310	4	15	6200	3348.0	14	Quan	tity Type	Depth	Linear Weight	Length	00.0		
17	9	W	3	0 45	5 3800	1539.0	19	_	2 V	V	310	3	39	8200	639.6	10		1 VV	250	33	3000	99.0		
18	12	W	3	0 45	6200	3348.0	20		2 V	V	360	5	51	7800	795.6	10			200	33	6200	2040.0		
19	2	W	3	0 39	8200	639.6	21		>							10		9 VV	310	40	3800	1039.0		
20	2	W	36	50 51	7800	795.6	22	_							8467.2 kg	10			310	40	6200	3348.0		
21							23	_								19		2 VV	260	59	7900	705.6		
22						8467.2	<b>kg</b> 24	3. M	lisce	llaneo	ous Steel					20		2 VV	300	51	1000	795.0		
23							25							=	=(F12+F22)*0.05	21		>				9467 2 k	a	
							26									22						0407.2 K	9	
							27									20	2.14							
							28									24	3. IV	liscellaneo	us Stee					
																25						848.7 k	g	
																26								
																27								
																28								

## Adding the Misc. Steel Estimate

 To calculate the weight of the steel deck, draw two polylines around the perimeter angle and the walls.



Create a new layer called 0 S02areas, make it non plottable, and draw the polylines.

## Calculating the Deck



- Enter the steel deck areas in Excel.
- The deck weight is 1.6psf (pounds per square foot)

	A	В	С	D	E	F	G	Н
10	1	OWSJ2		16	7003	112.0		
11								
12						8507.4	kg	
13	2. Bean	ns						
14	Quantity	Туре	Depth	Linear Weight	Length			
15	1	W	250	33	3000	99.0		
16	10	W	250	33	6200	2046.0		
17	9	W	310	45	3800	1539.0		
18	12	W	310	45	6200	3348.0		
19	2	W	310	39	8200	639.6		
20	2	W	360	51	7800	795.6		
21								
22						8467.2	kg	
23								
24	3. Misc	ellaneo	us Stee	l				
25						848.7	kg	
26								
27								
28								

### So after conversion the deck weight is 7.81 kg/m<sup>2</sup>

	A	В	С	D	E	F	G
22						8467.2	kg
23							
24	3. Misc	ellaneo	us Stee	I			
25						848.7	kg
26							
27	4. Stee	Deck					
28							
20	<b>\</b>	Office roof	-	278.736	m2		
30 •		Warehouse	e roof:	513.018	m2		
31							
32		Total roof		791.754	m2		
33							
34		Deck unit v	veight	7.81	kg/m2		
35							
36					Total	6183.6	kg
37							
38							

### Calculating the Deck



## The Final Result

	A	В	С	D	E	F	G
1	<b>Roof Steel Take-off</b>						
2							
3	1. Joists						
4	Quantity	Туре		Linear Weight	Length	Total	
5	37	OWSJ1		14.5	6200	3326.3	
6	1	OWSJ1		14.5	5940	86.1	
7	12	OWSJ1		14.5	6473	1126.3	
8	4	OWSJ2		16	6200	396.8	
9	17	OWSJ2		16	5967	1623.0	
10	14	OWSJ2		16	8200	1836.8	
11	1	OWSJ2		16	7003	112.0	
12							
13					Total	8507.4	kg
14	2. Bean	ns					
15	Quantity	Туре	Depth	Linear Weight	Length		
16	1	W	250	33	3000	99.0	
17	10	W	250	33	6200	2046.0	
18	9	W	310	45	3800	1539.0	
19	12	W	310	45	6200	3348.0	
20	2	W	310	39	8200	639.6	
21	2	W	360	51	7800	795.6	
22							
23					Total	8467.2	kg
24							
25	3. Misc	ellaneo	us Stee	I			
26					Total	848.7	kg
27							
28	4. Stee	Deck					
29							
30		Office roof		278.736	m2		
31		Warehouse roof:		513.018	m2		
32							
33		Total roof		791.754	m2		
34							
35	Deck unit weight		7.81	kg/m2			
36							
37					Total	6183.6	kg
38							
39							



