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The Official Publication of the AUGI Design Community

September 2020

19th Annual AUGI Salary Survey

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- Civil 3D Survey Tools
- Digital Space 3D Magician
- What Computer do I Need for Point Clouds?



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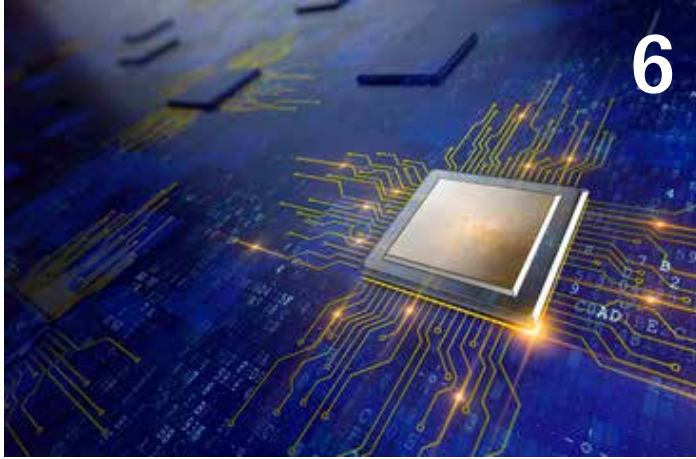
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contents

product focus



6

6 Autodesk Revit

What Computer Do I Need to Work with Point Clouds in Revit?

10 AutoCAD Civil 3D

Autodesk Civil 3D 2021 - Survey Tools

18



14 Civil 3D InfraWorks

Harness the Power of GIS in Civil 3D, InfraWorks, Revit & Beyond!

18 3ds Max

Digital Magician



21

columns

4 Letter from the President

21 Tech Manager

31 Inside Track



22

special feature

22 AUGI 2020 Salary Survey

Letter from the President



GREETINGS!

Time marches on, and there is just no stopping it! This rings especially true for September as I turn another year older. Not just another year older, but one year away from another big number, which I refuse to disclose! Life so far has not always been easy, but it is mine. I often wonder what my career would look like if I had not dropped out of college at the age of 18 (yes, I am a Penn State dropout!). Instead I took a year to explore real estate (bad idea at the time) and finally ended up in a technical school that catapulted the career path to where I am today. It is truly our own choices that guide the paths we take.

It is so easy to look back over life and question why some things happened, but the best we can do is look forward to whatever lies ahead while being present in today. This year has been one of uncertainty in our job market, and our hope here at AUGI is that we can continue to provide a platform of support and software information to help boost your skills for whatever lies ahead. Our forums are very active and there are always members there to help answer any questions you have. We would value your input, too!

September is one of our favorite AUGIWorld issues – our Annual Salary Survey issue! Finally some survey data we can believe! All of our data comes directly from you, our AUGI members. This is a great way to compare your salaries and job conditions to others in your field. We have even heard of members who have used the Salary Survey to obtain salary increases! (Disclaimer: we make no guarantee whatsoever that this will happen for you! But we are saying it has been done!) This year we had some additional Covid-19 related survey questions. Melanie Stone pours her heart and soul into managing this survey every year, and we again applaud her efforts with this edition! Members from all over the globe contribute to the Salary Survey, and we thank everyone who participated. If you missed out this year, look for the survey to open next July!

I hope everyone continues to stay safe and healthy as we continue on this journey of an uncertain year. I will do my best to blow out those birthday candles (fire extinguisher at the ready!) and make a wish for a better world!

Cheers!

Kimberly

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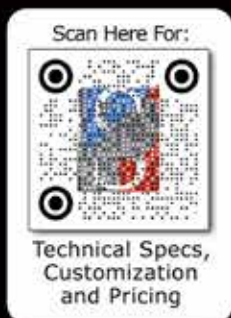
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What Computer do I Need to Work with Point Clouds in Revit?

Point Clouds in Revit and ReCap - Will your computer run it? If not, see what specs you should chose for your PC to work with point clouds.

Point cloud - a file that stores coordinates in XYZ space of a large number of points. There are many advantages when working with such files, but there is also one significant drawback – point clouds are very demanding to the computer system requirements. The simplest cloud usually weighs around 5GB while a point cloud of a large project can easily exceed 100GB.

When working in Revit there is an official computer system requirements guidance from Autodesk and a large community of users who can advise on choosing a right PC for a particular task. It is the opposite with point clouds as there is initially no information on how powerful a computer needs to be.

Based on several experiments conducted, let's try to find out how the PC requirements are affected depending on the size of the point cloud?

POINT CLOUDS FOR THE EXPERIMENT

Three point clouds were selected for this experiment:

A simple floor with almost no interior walls. This project was scanned only from the interior, therefore is missing the external walls and elevations of the building.

Point cloud size: 4.91GB

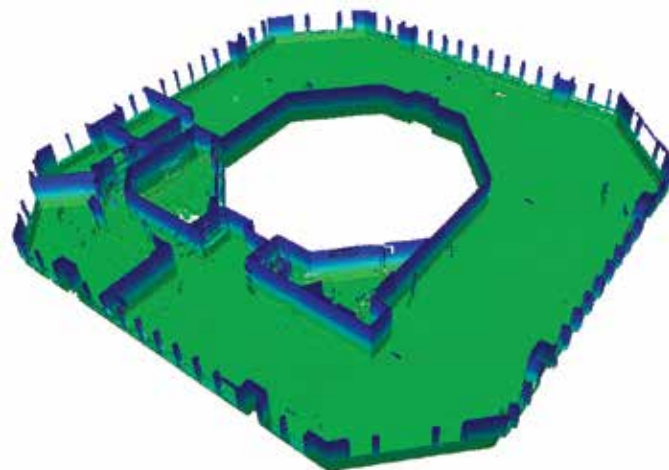


Figure 1 – Cloud N°1

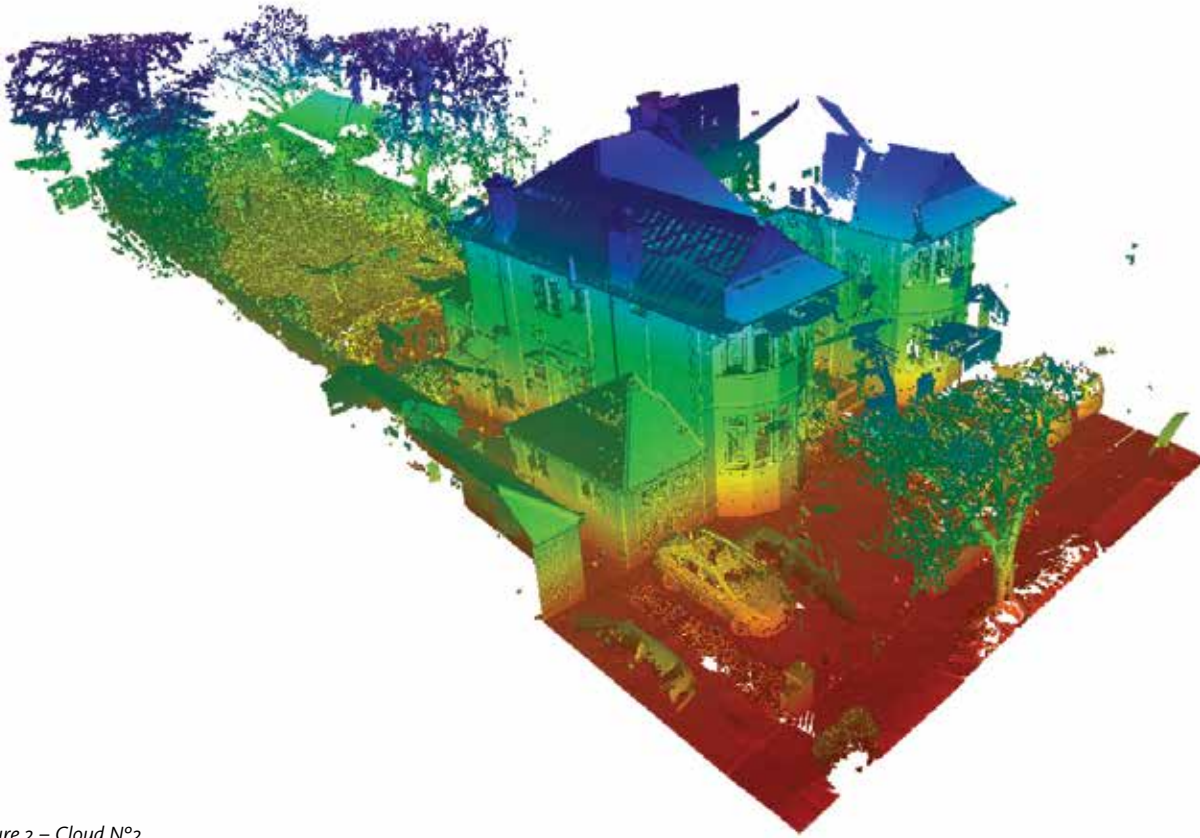


Figure 2 – Cloud N°2

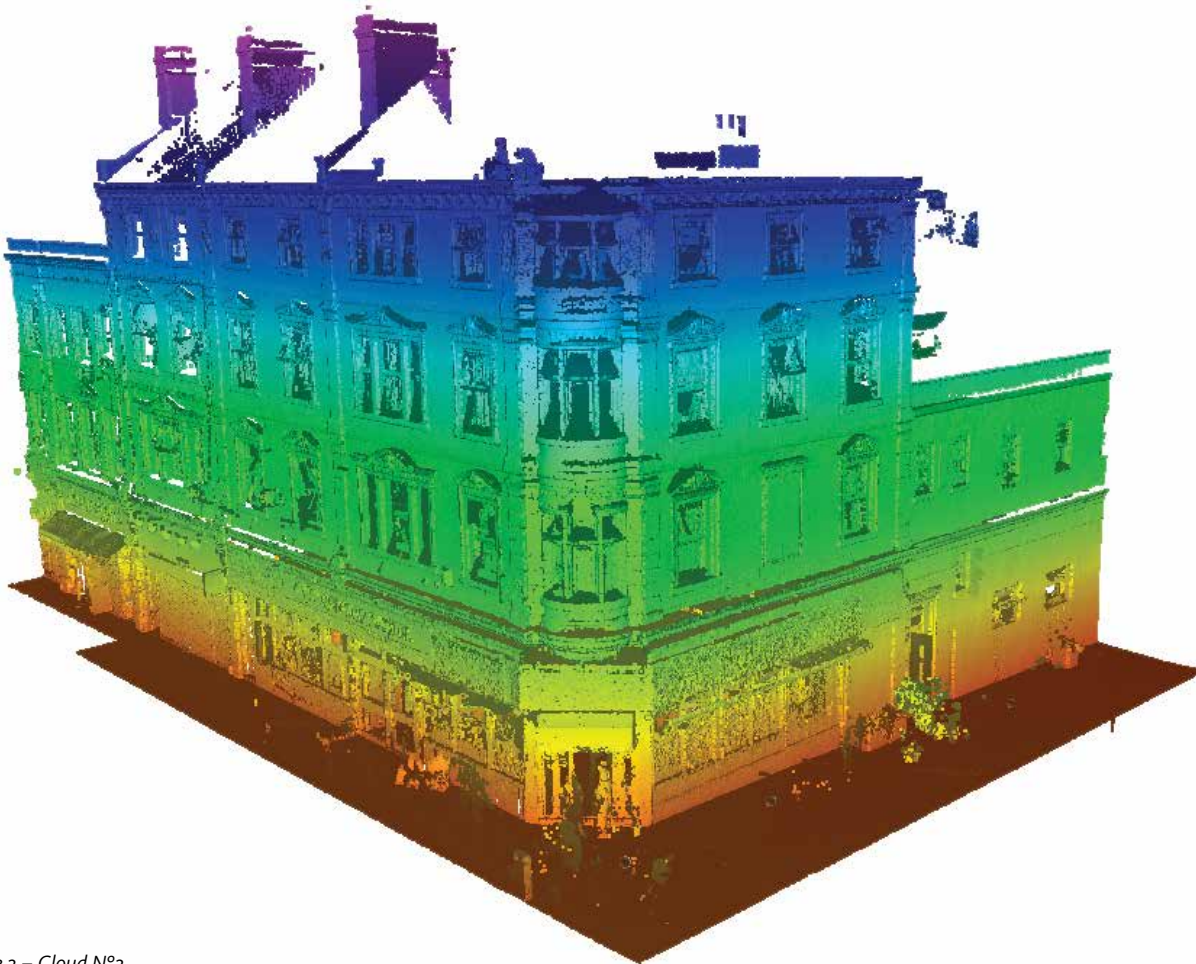


Figure 3 – Cloud N°3

Autodesk Revit 2020, Autodesk ReCap 7.0

Full 3d laser scan of the property, both internally and externally. This house (Figure 2) was scanned externally from all four sides and also two floors and a loft were scanned internally.

Point cloud size: 15.9GB

A hotel building (Figure 3) scanned both internally and externally. The building had four floors, plus a basement. In addition to the building survey, the surrounding land around the property was scanned too.

Point cloud size: 88.2GB

DETERMINATION OF THE MOST LOADED SYSTEM ELEMENTS.

All three point clouds were opened on the PC and the load on the system was measured using the task manager.

Testing was carried out on Windows 10. Autodesk Revit 2020 and ReCap version: 7.0.

PC specifications:

CPU: AMD Ryzen 5 3600

GPU: GeForce GTX1660Ti

RAM: 32Gb

Storage device: SSD

Experiment 1

For ReCap the resource utilization measurements were taken for opening a project and working with a project. For Revit, the resource utilization measurements were taken from working with a project. The project in the first experiment contains no elements and only the point cloud is loaded.

	ReCap			Revit (maximum load)		
	Cloud 1	Cloud 2	Cloud 3	Cloud 1	Cloud 2	Cloud 3
CPU	15%-20%	23%-25%	16%-23%	30%	32%	32%
RAM	10%-11%	14%-16%	14%-16%	18%	19%	26%
Storage device	10%-35%	55%-72%	50%-85%	-	-	50%
GPU	5%-42%	11%-40%	11%-40%	50%	50%	50%
Loading time	5,19 sec	10,16 sec	28 sec			

Conclusion: In ReCap the load on the CPU, memory and video card, changes are not significant with different point clouds. The difference in the load on the hard drive, however, is clearly visible, where with a larger point clouds there is constant access to the disk and the load reached 85% of the SSD resources.

In Revit, the CPU and GPU usage is higher, but also does not depend on the point cloud size. Memory resources grow steadily with the size of the point cloud. For small point clouds, hard drive resources are almost not used, but with a large point cloud, SSDs are used.

Experiment 2

Comparison of the load on the system when opening Revit with a point cloud uploaded to it vs opening a completed project in Revit with uploaded point cloud and a point cloud opened in ReCap at the same time.

	ReCap only	Revit only	ReCap+Revit+completed project in Revit
	Cloud 3	Cloud 3	Cloud 3 (average - peak)
CPU	16%-23%	32%	40%-85%
RAM	14%-16%	26%	50%-50%
Storage device	50%-85%	50%	0%-50%
GPU	11%-40%	50%	40%-80%

In actual operation of Revit + ReCap, the computer constantly experiences a heavy CPU load with peaks of up to 85%. The memory load is also steadily increased to 50%. The hard drive is hardly used when working in Revit. However, at times, peaks of up to 50% appear. When working in ReCap, there is a constant hard drive load of 20% -30% with peaks up to 50%. The video card has a constant load of 40% with rare peaks up to 80%.

Overall, the average CPU and GPU load has not significantly increased compared to working in Revit or ReCap alone. The only differences are the peaks in maximum loads. The disk is not used significantly in Revit compared to ReCap. The main load goes to the RAM, which is used linearly more.

Conclusion: To work with point clouds, regardless of the cloud size, you need your PC to have a set of characteristics on the CPU + GPU + Hard disk. The sizes of the point clouds you are planning to work with also affects the amount of RAM required. With large point clouds, the CPU and graphics card must cope with occasional peaks.

WORKING WITH POINT CLOUDS ON DIFFERENT PCS

For the experiment, 4 personal computers and 1 laptop were chosen:

	Laptop 1	PC1	PC 2	PC 3	PC 4
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CPU	Intel Core i5-5200u	Intel Core i5-3550	AMD Ryzen 5 1600	AMD Ryzen 5 3600	Intel Core i9 7980 Xe
GPU	GeForce 940m	Radeon R9 200	GeForce GTX1070	GeForce GTX1660Ti	GeForce GTX1080Ti SLI
RAM	12Gb	12Gb	16Gb	32Gb	64Gb
Storage device	HDD	HDD	SSD	SSD	SSD

Comparison of the characteristics of computers for the experiment.

The comparison was carried out on a 10-point system. The highest score was chosen for 10 points. The remaining is a percentage of it.

CPU comparison

	Laptop 1	PC1	PC 2	PC 3	PC 4
CPU	Intel Core i5- 5200u	Intel Core i5- 3550	AMD Ryzen 5 1600	AMD Ryzen 5 3600	Intel Core i9 7980 Xe
Points	0.9	1.6	3.8	5.3	10

GPU comparison

	Laptop 1	PC1	PC 2	PC 3	PC 4
Video card	GeForce 940m	Radeon R9 200	GeForce GTX1070	GeForce GTX1660Ti	GeForce GTX1080Ti
Points	0.8	2.5	6.8	6.8	10

ASSESSMENT OF COMPUTERS FOR A COMFORTABLE WORK

The comfort assessment was carried out on a 10-point scale system, where:

- 1 point - it is almost impossible to work, there is a freeze after each operation, the program closes or the system crashes.
- 3 points - it is very difficult to work, often the system freezes, long point cloud loading.
- 5 points - it is difficult to work, some individual elements like floor plans do not create difficulties, other individual elements like facades lag and take a long time to load.
- 7 points – it is possible to work quite comfortably, occasional lags on complex elements appear.
- 10 points – comfortable to work without any computer lags or freezing.

CHOOSING THE RIGHT COMPUTER TO WORK WITH POINT CLOUDS IN REVIT

1. Laptops are rarely a suitable option for this kind of work. There are some gaming models with good characteristics, but during operation they usually get very hot and it will become difficult to work with. External cooling systems also do not help much.

	Point Cloud N° 1 4,91 Gb	Point Cloud N° 2 15,9 Gb	Point Cloud N° 3 88,2 Gb
Laptop N° 1 Intel Core i5- 5200u, GeForce 940m, 8Gb, HDD	3	1	0
PC 1 Intel Core i5-3550 Radeon R9 200 12Gb Storage device: HDD	7	4	3
PC 2 AMD Ryzen 5 1600 GeForce GTX1070 16Gb Storage device: SSD	9	7	6
PC 3 AMD Ryzen 5 3600 GeForce GTX1660Ti 32Gb Storage device: SSD	10	9	7
PC 4 Intel Core i9 7980 Xe GeForce GTX1080Ti SLI 64Gb Storage device: SSD	10	10	10


2. Storage device - SSD. When working with point clouds, the hard disk is often accessed, so an SSD is the necessary choice for such work.
3. RAM - 16 GB is the minimum you would need for working with point clouds. A lower value is only suitable for very small point clouds. 32GB or more is the recommended value.
4. The CPU depends on the sizes of projects you are planning to work with. For small projects, AMD Ryzen 5 1600, Intel Core i5-3550 CPU models and their analogs will be sufficient. For multi-story buildings and complex industrial buildings, the minimum CPU model should be AMD Ryzen 5 3600 or higher.
5. GPU – similarly to the CPU, it all depends on the point clouds you plan to work with. For small houses, the models Radeon R9 200, GeForce GTX1070 and their analogs will be sufficient. For multi-story buildings and complex industrial buildings, the minimum model to be considered is the GeForce GTX1070, GeForce GTX1660Ti and their analogues.



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Autodesk Civil 3D 2021 - Survey Tools

 Well, since this is the Salary Survey edition of the magazine, I thought it was fitting to review some “Survey” tools! After all, most projects begin and end with survey, but I feelx like it gets often overlooked in Civil 3D.

GIS Data is also key to most Civil projects. What does GIS stand for?? **GET IT SURVEYED!!** Just kidding.

That joke goes over much better with the survey audience. But I love working with GIS data on all my projects as well. I typically do not begin a project without using some sort of GIS data in addition to the survey data.

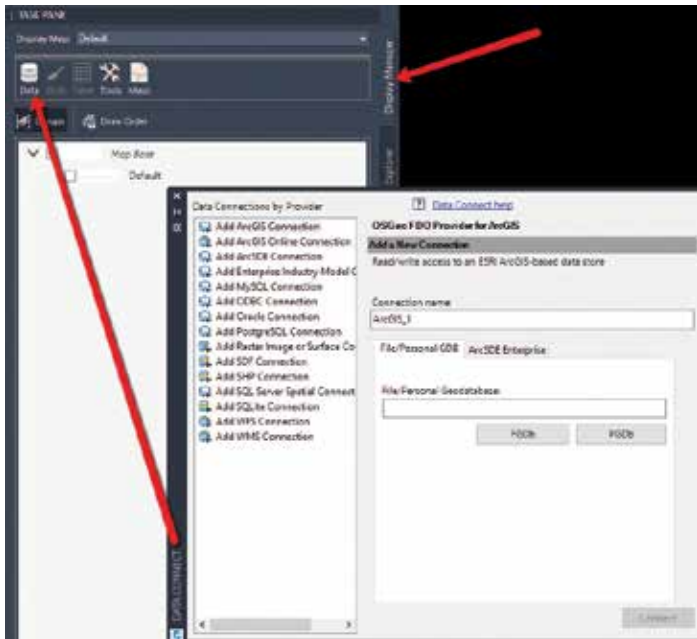
So here is some survey related tools I use on almost every project.

GIS DATA

By far my favorite command in Civil 3D is **MAPWSPACE!!** One simple command can open the portal to utilizing the power of GIS data. You could change your Civil 3D workspace to the Planning and Analysis tab, but this gets you started with using the GIS data.

Once you type in **MAPWSPACE**, you then turn on the Map Task Pane. The Task Pane gives you quick access to frequently used features, and groups these features into task-related views. Use the Task Pane to create, manage, display, and publish maps. You will notice 4 tabs; in this case we will focus on the Display Manager.

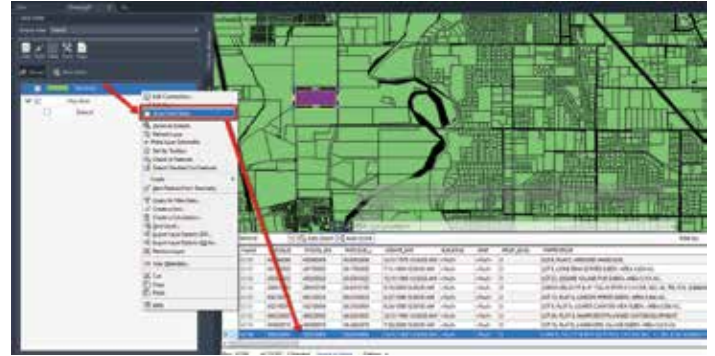
In the Display Manager, you can simply select the **DATA** icon and connect to numerous data sources! Here you can import shapefiles, connect to external databases, and even bring in imagery.



Did you know you can simply select your shapefile from Windows Explorer and drag and drop it on your screen? By far the easiest way to import GIS data!! Once dragged onto your screen, the layer will show in the task pane where you can query, theme, style, label and access all the attribute data within the DBF file. If your coordinate system is set, it will project to the correct location, or re-project as needed.

TIP: Need to do a quick concept plan? Drag and drop your parcel shapefile, select the property you wish to use, right-click, check out feature and explode!! This creates a polyline that you can then utilize the parcel features on. And if your CAD manager asks who told you to explode something in Civil 3D....it wasn't me!

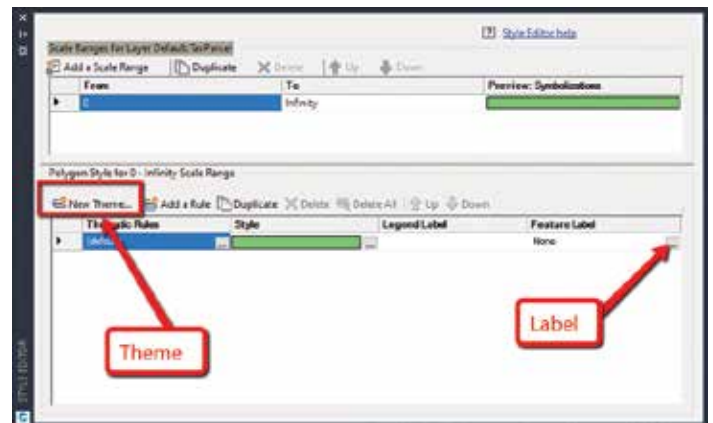
Select the entire layer from the Task Pane, or even a feature from within model space, right-click and choose **SHOW DATA TABLE**. This will display all attributes for that selected feature.



Right-click again on the layer from the Task Pane, you can perform all sorts of analysis and creation tasks right from here. Want to label and change the display? Simply select **Edit Style**.

In the Style Editor, you can perform many helpful tasks. You could, for example, theme the parcel shapefile and look for all parcels between 5-10 acres. This works great for soil types, utility line sizes and many other uses. You could also edit the style (hatch pattern/polyline) as well as add a label based on the feature attributes.

All this from dragging and dropping a shapefile and using the Task Pane! All without switching workspaces and great for just getting started with GIS data.



QGIS

We are working with larger data than ever before. Drone data and aerial imagery is now at the tips of our fingers anytime we want them. Some raster images can be many GB in size and resolution that Civil 3D cannot handle. If you have ever tried to import a GeoTiff (or other image types), and you get the "Invalid Image" warning, then QGIS is exactly what you need!

This is a **FREE** open source software tool that allows you to reduce the size of large images quickly and easily, and even translate to other coordinate systems if you'd like. Just go to www.qgis.org and download it.

AutoCAD Civil 3D

You simply drag and drop your image into the QGIS desktop, right-click on your layer (image) and export to a new rendered image!!

TRAVERSE EDITOR

Recreating deeds has always been a long, time consuming process. Drawing geometry line by line, arc by arc, can get a little bit boring and mistakes can easily creep in. But there are 2 options in Civil 3D that can help on this task. There is the COGO Editor and Traverse Editor. I will review the Traverse Editor below.

Traverse Editor

- You can use this to create 2D traverses by either selecting a polyline, or typically by entering deed data in the dialog box. You can specify whether you want to create points, lines, or points and lines in the drawing as you enter data. These objects remain in the drawing after you close the Traverse Editor. And for longer deeds, you can save your entry data and come back at a later time if needed.
- You can enter traverse data in the Traverse Editor by creating traverse sides. Side types can be Point, Line, Chord Arc, Radial Arc, or Side Shot. The first entry must be a point of beginning (POB).



WRITING LEGAL DESCRIPTIONS

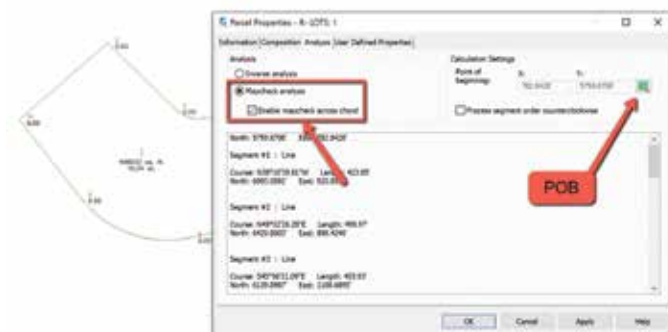
The Reports Manager from within the Toolbox has some great reporting tools. Out of the box they work great, and with a little customization you can end up saving a ton of time.

The first thing I do prior to running a parcel report is set the point of beginning. That way your legal descriptions come out in the right order and you spend less time editing. Note: You must use parcels for this workflow, so if you need a legal description, simply turn your linework into a parcel, or parcels.

Setting your POB

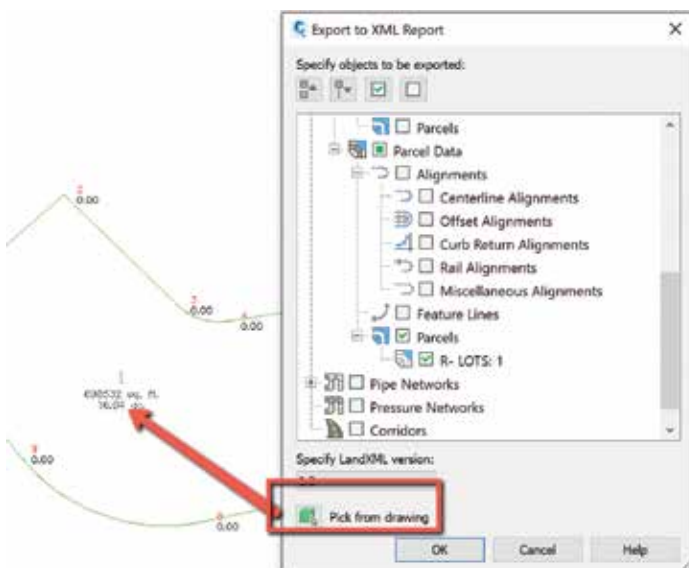
- Select the parcel you want to create a legal description for, right-click and go to Parcel Properties.
- Change to the ANALYSIS tab.
- In the upper right, under Calculation settings, you can change the Point of Beginning by selecting the green box and selecting the points from within your drawing.

- Need error of closure data? You can also perform a Mapcheck Analysis right here in the same screen!



Parcel Reports

- Once you have set your POB, switch to the Toolbox tab of your Toolspace.
- Expand Reports Manager and expand Parcels.
- There are several options to choose from. On either option you can select the option, right-click and choose Execute.
- Use the Pick from Drawing option on the bottom left. You must select the Parcel Area Label itself, not the linework. You can select multiple, or one single parcel also.
- Select OK
- The description will open in a browser, although sometimes formatted weird, and then you can copy and paste into AutoCAD as MTEXT (or word/email).



MAPCHECK ANALYSIS

You can use the Mapcheck Analysis command to perform a mapcheck that is based on the precision of your label. This can be a line/curve label or parcels labels. It will read the direction of your bearing call (NW v/s SE, etc.) so ensure that they are labeled correctly.

Type in **MAPCHECK** to launch the analysis or find it from the Ribbon on the Analyze tab, to the far left under Survey.

To perform a mapcheck you must specify a point of beginning (POB) for each parcel. For each segment within the parcel, you select a label containing a direction, direction and distance, distance label, or curve label until the requirements to compute the next vertex of the current segment are met.

As you perform a mapcheck, selecting label by label, temporary graphics are displayed in the drawing to indicate the sides that have been entered for each parcel. The current side is displayed in bold indicating origin and direction for that side. The temporary graphics also provide a visual confirmation of possible errors or indicate that the direction of a line or curve needs to be flipped or reversed.



PROJECTING OBJECTS TO PROFILE (OR SECTION) VIEWS

Projecting points into your profile and sections can really help in design and displaying existing features. Take an existing high-pressure gas main for example. You may have gone out to pot hole a main at some point, and need to show that in profile view to ensure no utility crossings conflict. So, importing your points, and projecting those to your profile is very simple. You can project points, feature lines, blocks, and all sorts of objects to your profile.

Project Objects to Profile

- First, import your points.
- Select the Profile View you want to project your points into.
- From the Ribbon, on the Launch Pad panel, select Project Objects to Profile View
- Select the point, or multiple points, that you want to project. The dialog box will appear where you can set object and label styles.
- This will project based on the point elevation, so if you shot top of pipe, it will appear at the top of pipe elevation. (Unless you change to other options).
- Select OK and your object is now shown and labeled in your profile view.



PARCEL PROPERTIES MANAGER

Have you ever used this before? Well neither have I until just a couple weeks ago. This is a pretty quick way to globally change parcel styles and area label styles, without going in one-by-one. You can also add info to the description of each individual parcel. I use the description field a lot in plats, whether for addresses, tax ID numbers or simple notes.

In addition, you can also export a list of parcels to a CSV file for use in other applications, such as other GIS platforms. The list can also be used as the basis of AutoCAD tables and text objects within the drawing.

This tool can be found under the Miscellaneous Tools on the Toolbox. Give it a shot and see what you think!

CONCLUSION

Yes, I have skipped the obvious "Field to Finish" workflows for now. By now people have decided whether they want to use that or not, so I focused on a few other tools that help me in day to day project workflows. In an upcoming article I will detail the setup and workflows needed to perform the automated linework, or Field to Finish options.

I would love to hear from you regarding the survey tools you use and any tips or tricks you have, as well as feature requests for survey. So, feel free to call or email me anytime.



Shawn has been a part of the design engineering community for roughly 15 years in all aspects of design, construction, and software implementations. He has implemented and trained companies across the Country on Civil 3D and other infrastructure tools and their best practice workflows. Shawn can be reached for comments or questions at sherring@prosoftnet.com.

Harness the Power of GIS in Civil 3D, InfraWorks, Revit & Beyond!



SHOULD I... USE GIS DATA?

I get asked all the time, where can I find “GOOD”, “FREE” (*Not sure if “good” & “free” are complimentary terms*) GIS data? What about “FREE” Satellite imagery? Would GIS be helpful for me?

Technically some of these images are not even from satellites, lots of them are really just aerial photographs from planes. But ‘Bird Mode’ doesn’t sound as cool... at least that what the Google Earth executives thought when they finalized the name. Other names discussed included “Airplane View,” “Superman,” and “I Feel Picture-y.”

The short answers are, depends on what you are looking for. Yes you can, yes it will, and you get what you pay (or don’t pay) for.

Long answer: Really the best option is either Google; what you are looking for using the name of the location (Google “<city/county name>, download GIS”) you want it for, OR use ArcGIS Online. Well you can pay for hi-res data or find free sources.

Would contours, or pipe inverts, structures, watersheds, flood maps, centerlines, rights-of-way, utility locations be helpful to you?

However, trying to find and access this data has been a hit and miss over the last few decades. Some places publish ‘shapefiles’ online, some places only allow you to view the data through a web interface.

Tip: Some agencies really bury the GIS portals or data. For example, try googling Orange County Storm GIS and it will take you to the OC Public works maps & drawings page. But there is no GIS data on this page. Just a couple of PDF’s. My tip is to try typing GIS in the agency’s websites search tool. For the OC Public Works this took me to what I was looking for.

HOW CAN I USE GIS?

There are so many ways to use GIS data, from creating maps, analyzing the data, and even creating apps. It can help Identify problems, monitor change, manage & respond to events, perform forecasting, set priorities, understand trends, locate existing features and so much more.



HOW DO I FIND FREE GIS?

- Honestly, Start looking in:
 - Google "infrastructure" + "free GIS"
- Most Agencies have GIS data.
- A lot of Agencies have it posted online, part of the "Freedom of Information Act". BUT, it could be just a download zip file, API links, or they might have their own special map viewer.
- If you cannot access the data or have issues or question about it, then find sending a email to the contact for that data usually gets a response.
- A great new source in ArcGIS online has free data posted from various sources.
- A lot of agencies already have GIS databases in ArcMap and other ESRI products, which makes it easy to publish to ArcGIS Online.



Links from image above: gisgeography.com
 10 Free GIS Data Sources: Best Global Raster and Vector Datasets [2020] <https://gisgeography.com/best-free-gis-data-sources-raster-vector/>
 More Free GIS Data

If you haven't found what you're looking for, here are more free GIS data sources to superpower your maps:
 15 Free Satellite Imagery Data Sources
 Free Global DEM Data Sources – Digital Elevation Models
 Top 6 Free LiDAR Data Sources

WHAT SOFTWARE PROGRAMS CAN DIRECTLY IMPORT GIS DATA?

With the partnership between ESRI and Autodesk in 2017, this has opened a whole new galaxy of data; free data you can use for your project. No longer do you need to download shapefiles then import them into Map 3D (Civil 3D) or InfraWorks. No longer will these shapefiles be out of date or in need of being updated manually.



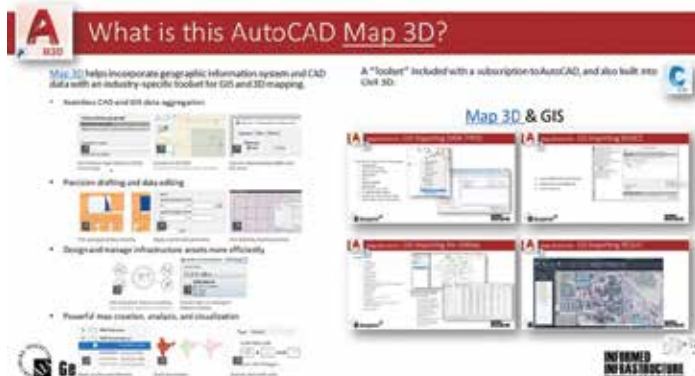
If you want to watch the step-by-step instructions, download the PDF and earn PDH credits. For the workflow above, visit the

Informed Infrastructure "Harness the Power of GIS link below.

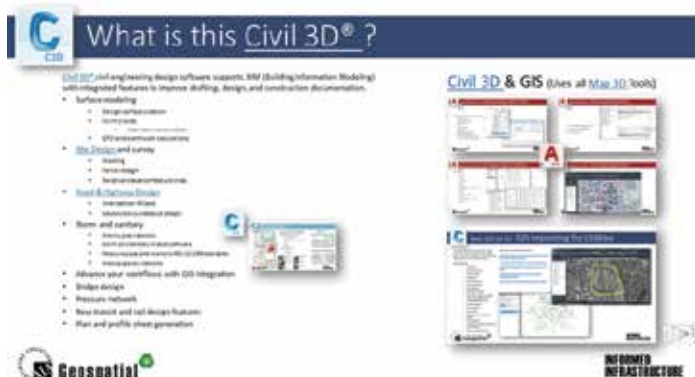


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INFRAWORKS



ARCGIS ONLINE



REVIT



StarLordJames (James Lord) is 100% nerd at heart. I love all new technology, software and any futurist view I can get my hands on. I enjoy learning about new features or deciphering the inner-workings and I especially love discovering new uses for things not originally intended. Creating new workflows to increase efficiency is always my goal in whatever I do. "Why do something the hard way or waste time just because that is the way we have always done it?" I love traveling, meeting new people and just listening to their stories, issues or concerns. It really doesn't matter if it is a personal or a technical issue, the joy comes from trying to figure out a solution to that issue, or just letting someone vent. Being helpful in any way is a truly rewarding experience. As a presenter, teacher, instructor and mentor, I am always trying to find a better and more entertaining way to effectively communicate with people. We all learn and process information differently, so I try to adapt on the fly when I can tell someone is just not getting it. If you can make it fun, then they are more likely to remember. Sometimes the content can be a bit dense, so it is entertaining to play a game or put a spin on it, like when I was tasked to create an instructional video about using a plotter. I threw in a little Star Wars to spice it up: <https://www.youtube.com/watch?v=VumIGDDYwzc> . Checkout more of my published articles via my LinkedIn page: <https://www.linkedin.com/in/starlordjames>

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Digital Magician

➡ **C**ompetition in the 3D digital space is borderless and fraught with obstacles, traps, mazes, and pitfalls built to eliminate the faint at heart, the non-persistent, the “noob”. These are people who don’t just love strategy and games; they spend their lives learning how to build them. They eat and survive (quite literally) by torturing others with level after level of grueling tests and trials.

This competition is fierce for those who teach and share tutorials and content online as well. They leave out critical details. They’ll downplay and mention essential steps just briefly. Like magicians, they want to show you the trick but not exactly every part of how they are doing it. Only the savviest of viewers will recognize how critical a step might be and be able to call out their “sleight-of-hand”. In the end, those who persist can learn the tricks of the trade and receive their reward.

So, for this article, I’ll share a few secrets to avoid the pitfalls so you can be a 3D magician and compete in this worldwide digital space. Refer to Figures 1 and 2, where I’ll explain how users are turning even ordinary (or dull) content into interesting content in just a few short hours. Don’t blink; you might miss it.



Figure 1



Figure 2



THE TOOLS

Being a magician doesn’t come without expense. To follow these steps, you’ll need 3ds Max, Substance Painter, and Unreal Engine. Autodesk just released 3ds Max to indie users making less than 100K (US) per year for only \$250 a year. Substance Painter is the leader in 3D texture painting in the industry today and costs \$20 a month. Unreal Engine is free for everyone, and Epic Games recently announced it wouldn’t collect fees from anyone making less than a whopping one million dollars (US) using it.

THE FOUNDATIONS

Start by assigning unique materials to your object. For large objects like sci-fi ships with a lot of greeble elements, or a mech unit, you can apply a random material script. See Figure 3, for example.

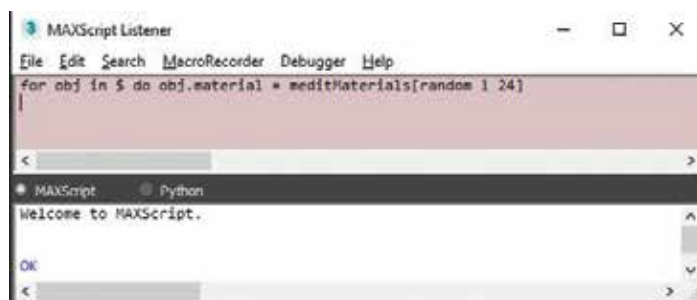


Figure 3

Where random materials won’t work, and you want more control, you need to assign materials to the specific parts. Don’t bother with building materials. That doesn’t matter. What’s important is that the objects you want have a different material from the material slot assigned to it. For example, the four wheels all have a single material while the bars have another.

EXPORT AND PAINT

Now, export to the FBX file format. Open Substance Painter and drag the file from your location into the software, which will open the import options. For my computer, I choose the PBR template, but typically adjust the resolution higher (selecting 2048) and the change the Normal Map format from DirectX to OpenGL to take advantage of resources on my computer. The

auto-unwrap is in beta stages, but I've not seen any particular downfall to using it at this point for quick work. If you prefer, you can have more control over unwrapping by applying the Unwrap UVW modifier in 3ds Max to your objects, flatten them, then collapse it to your object before exporting out of 3ds Max. If you do that, ignore the auto-unwrap option during the substance import displayed in Figure 4.

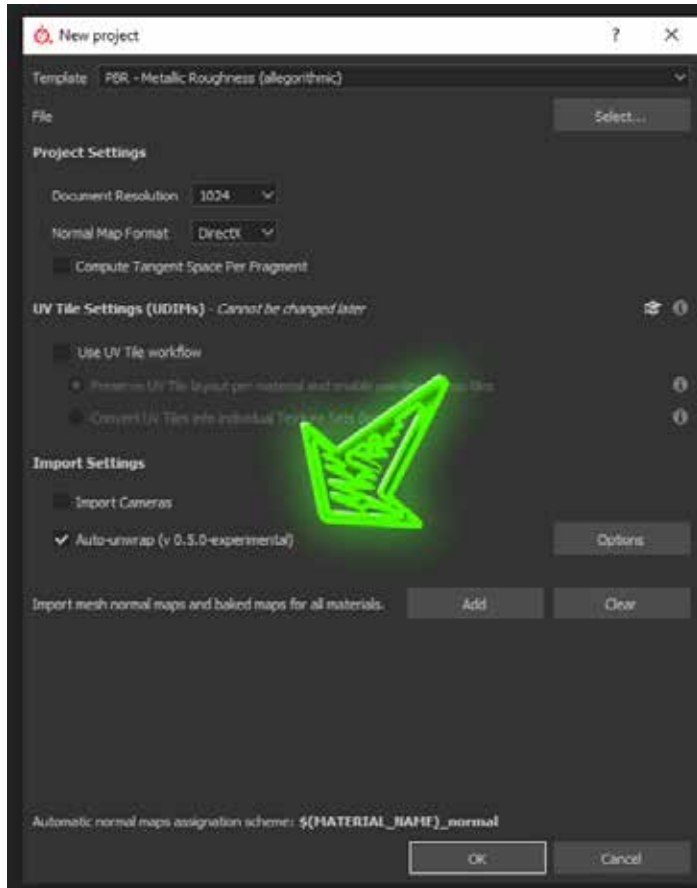


Figure 4



This next step is crucial, and one of those "sleight-of-hand" topics. However, it's key to being able to proceed. Under the Edit menu, select Bake Mesh Maps. Set your resolution, which will vary based on your own experience as baking the maps can take different times depending on the computer resources and complexity of the object. I've never had issues selecting 2048 for most mech-type units. Typically, I leave the Normal, World Space Normal, ID, Ambient Occlusion, Curvature, Position, and Thickness options checked as shown on the dialogue marked with number one in Figure 5.



Figure 5

Now use the various tools and methods inside Substance Painter to paint your 3D object. If you refer to number two in Figure 5, you can see that we can drag and drop materials onto our object. These materials will apply to those we established in 3ds Max before export. There are many tutorials online on how to use and paint with Substance Painter, but a few of the primary strengths are:

1. Paint in 3D
2. Strong material and smart material library
3. Powerful painting options with stencils, textures, alpha masks, and even normal maps
4. Generative damage and mask tools
5. Overlay and blending option of paint layers
6. Particle paint tools to apply paint in the form of veins, rain, fire, cracks, etc.

Finally, export your mesh and textures. Now you can import your object and textures into Unreal Engine (or any other software you prefer). I used Unreal Engine for the example displayed in Figure 2. With Unreal Engine, I set up a scene, applied a camera (while adjusting its post-process effects), and changed the materials of my object using the node editor. You can see in my Substance Painter image I initially used a green color for my object. When I set up a sunset scene in Unreal Engine, I realized yellow/orange was more appealing in the natural rocky and canyon background. A simple process to adjust in Unreal Engine using the node editor. To ensure this article doesn't stretch too long, if you're interested in understanding the process of working between 3ds Max, Substance Painter, and Unreal Engine more, please feel free to email me.



Brian Chapman is an Autodesk Authorized Developer and CAD Applications Specialist for Westwood Professional Services. Brian can be reached at procadman@pro-cad.net. You can review some of his personal work at emptypawn.com and procad.blog

The Best is Yet to Come – or is it Already Here?



With the Annual Salary Review being published by AUGI, most of you are thinking... “Can I do better? Are others making more than me? Is it really time to make a move?” or you may be saying to yourself, “I have the best job in the world and I am also making good money.” Whether you are in the first category (need a change) or the latter (I am good), you are pondering the options, weighing the good and the bad, looking around and thinking of what might be next.

It is easy to see the problems and the complaint areas. They hit you in the face every day, or week, and you get frustrated with having to put up with the same issues again and again. It might be the benefits, the pay, the work environment, or a cranky boss or co-worker... but they are easy to spot and easy to let get under your skin.

But that is not my tack for this article. I want to look at the positives. I want to think back to when you were most happy in your work (and it might be right now). I want you to review the niceties that you have going for you at your work.

THE PEOPLE

This is consistently among the highest-ranking impacts on job satisfaction and whether you are engaged and thriving at work. The impact of COVID on the workflow can impact your relationships mechanics, but the people you work with can either make it a pleasure or a challenge when trying to get things done. Think about how you transitioned to remote work or how you have re-entered the workplace. The people make it happen. Are they flexible? Can they adapt? Are they stuck trying to return to the exact normal they left? Working with resilient people makes you resilient also. People that work well together are not easy to come by.

THE PROJECTS

The actual work that you do each day/week/year can make it exciting to come to work. It can make you eager to get online and make plans for coordinating the work. The projects that your firm works on can be invigorating or tedious. They can energize or they can drain you. If you work with a firm that has exciting clients with great projects... count that as a win.

THE PROGRESS

When it comes to projects, does your firm make progress on them? If they are striving for new ways to become more productive, seek out new project models, and partner with great contractors and consultants, then you have a nice workplace.

THE PERMANENCE

Do you have job stability? Being at a stable firm now is critical. You do not want to join the rolls of the unemployed. Your firm may be on shaky ground or rock solid. If they are stable, with a backlog of project ahead of them, that is good. If they have an expanding client list, that is great. If they have an increase in workload, that is fabulous.

THE PURPOSE

Does your firm have a purpose other than just making money? Do they think of the environment and social issues? Firms should be caring for their employees. They should do some pro-bono work. They should care about the neighborhood and city where the building is located. Contributing to park spaces, caring for the homeless, working with youth in the local region. It may be a little or a lot, but they should be doing something. If they are, then count that among the perks of being their employee. They are looked at by the community as a great resource for manpower and support.

THE PLACE

The building you work in is key to satisfaction. If you are back in the building, have they retrofitted to support social distancing and hygiene needs? If you are working from home, do they empower you to get the hardware you need? The connectivity, the training? Working from home can be a taxing time or a blessing. The firm can support your efforts if they understand your situation (kids, no kids) and empower you to be productive.

THE PERKS

The benefits, time off, vacation, flexibility, working hours, etc. All of these add up to fulfillment in your career. What do you really need or want? Is it time off? Is it better medical? Is it flexibility in your work hours? If you can score a win in the key areas... it is a win overall.

THE POSITIVITY

The culture of your firm contributes in a sometimes-hidden way to your gratification in your work life. No one wants to work with grumpy people that cannot get along. No one likes to not have supportive staff that will come alongside and help when you need them. No one really cares about the formal job description and

what might fall outside of it when they need help. If your firm has been knocked around, do the top leaders show positive attitudes about the future? If so, that will allow the staff to press on, even when things are tough.

THE PERSONAL

Not personnel – I am not talking about the staff. I am talking about you. You should bring your best game to work each day. Others are impacted by your efforts, attitudes, diligence, dependability, and expertise. You are key to their contentment. You feed off them and they feed off of you. Bring a positive bent and others will catch the focus and move along with you. Help them have a great place to work.

THE PAY

I put this last on purpose. Money isn't everything. It is very important, but not king. If you are struggling to make ends meet with the salary you have, you may be underpaid. Add a new skill and move up the ladder. Seek new responsibilities and pay will eventually rise along with your career. But do not boil it all down to what you are paid. Getting more money at another firm might lose you all the other great things on the list above. Get the education, training skills and talent you need to make a decent wage, but do not expect the world to pay more for the same skills you have now. Only by expanding can you garner more money, with the firm you are at now, or with another.

All in all, looking at the salary survey can be depressing or comforting, depending on where you are in your career stages. Let others know if you feel you are underpaid and use the survey to help demonstrate that, but do not leave out the intangibles of what makes for a great workplace.



Mark Kiker has more than 25 years of hands-on experience with technology. He is fully versed in every area of management from deployment planning, installation, and configuration to training and strategic planning. As an internationally known speaker and writer, he is a returning speaker at Autodesk University since 1996. Mark is currently serving as Director of IT for SIATech, a non-profit public charter high school focused on dropout recovery. He maintains two blog sites, www.caddmanager.com and www.bimmanager.com.

19th Annual AUGI Salary Survey

We hope our members are faring well, staying healthy, and reaching out to their networks, both professional and personal.

Lets dig in and see what has been happening in our industry since last year's survey.

Please keep an eye out for email blasts, social media channel updates and the forums next summer so you can participate, too!

We appreciate those members who were able to take the time to participate in this year's survey. Our participation was lower than expected by about 1/3, so, if you are reading this and do not remember seeing the email bulletins with the survey link and salary content, please be sure to go to augi.com/account to ensure your email address is current. If you need help accessing your account, reach out to membership@augi.com. Then check augi.com/account/email-subscriptions to ensure 'Bulletins' is checked 'Yes'.

As long as you're on the site, you might also want to register yourself in the Resource Directory, so other members know if you are available for work, and add categories so potential clients can find your specialty. augi.com/resource-directory

As always, when members take the survey, they are asked to reply with the details from their last fulltime role, and to indicate any job changes in later questions. Our 'Hot Topic' page this year is dedicated to the impact the pandemic may have had on our jobs and the adaptability of our teams.

The first question people have with regard to our salaries, is always the

differences in Cost of Living in various areas. Metropolitan areas and rural areas can be costly or affordable no matter the location, so be sure to check additional resources for those variances. For example, according to the ETC Salary Calculator, an Architectural Drafter with an Associate's degree and 6-10 years of experience could make \$56,000 a year in Tennessee, and \$64,000 a year in the New York City metro area.

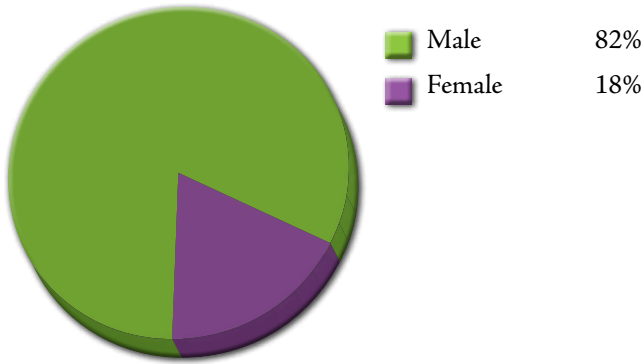
I am a big fan of www.Indeed.com/Salary, the ETC Salary Calculator, Glassdoor, as well as industry- specific surveys from other professional organizations. The salaries reported here (in US dollars, as participants were given a link to a currency convertor) reflect salary and bonuses for those who work 40 hours a week, and are calculated to exclude overtime pay.

Ten years ago, the ability to telecommute was only 15%, but, gradually increased over time, until it spiked to 50% this year. On our look back page, you can see that perceptions of job security for our members aren't that bad at the moment (but, that might be due to the members we expected to hear from, but, didn't, who might have pulled that number down).

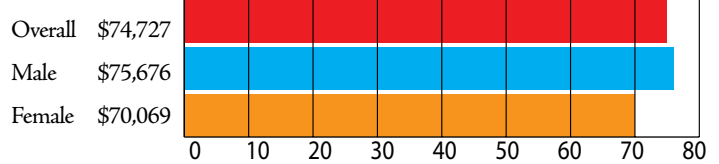
Designer remains our most common job title, so we have our closeup, with specifics of how that job looks to our membership.

DEMOGRAPHICS

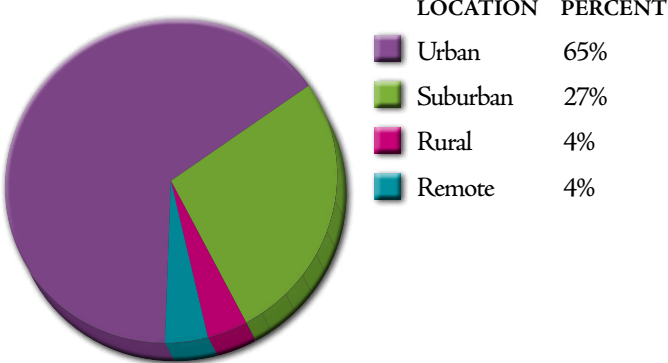
Employee Gender



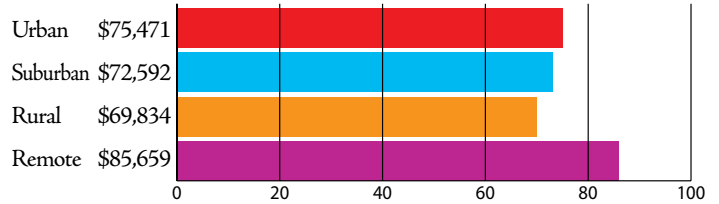
Average Pay



Work Location

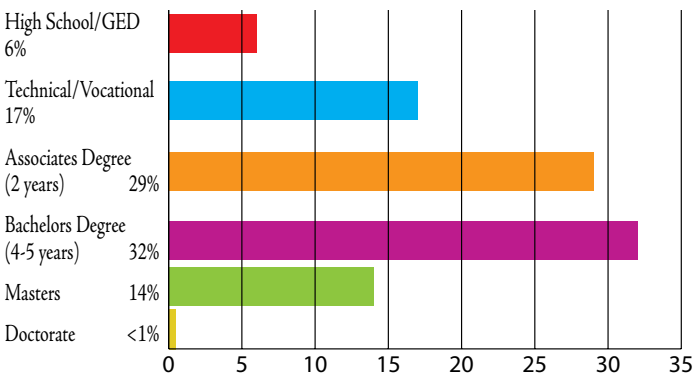


Pay by Work Location



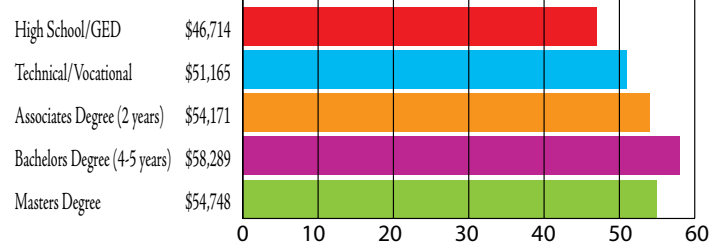
When this survey began in 2002, only 27% of members had a Bachelor's degree or higher.

Education Level/Degree Attained

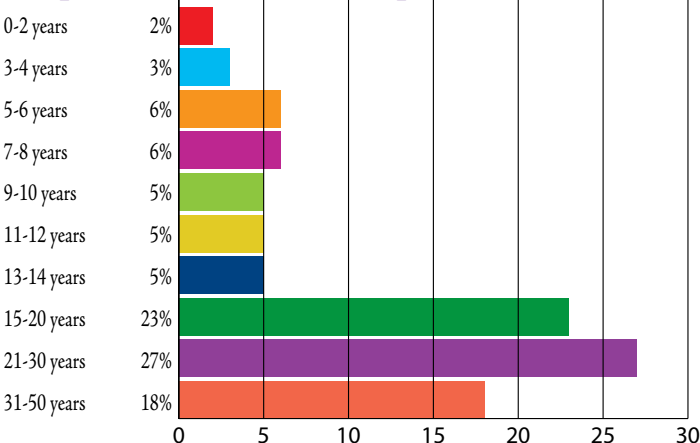


Average Pay by Education Level

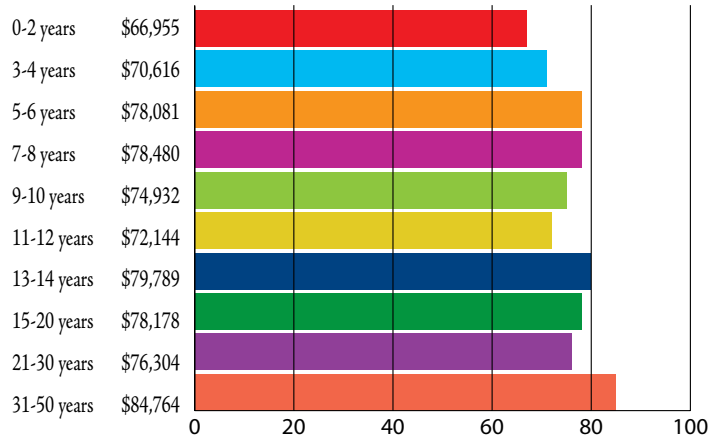
(for those with 5 or fewer years of experience)



Respondents' Years of Experience



Average Pay by Years of Experience



Check out these resources for additional information on pay:

- Indeed.com/salary
- ETC Salary Calculator
- Salary.com
- Glassdoor
- Payscale.com

Search for other professional organizations related to your market, or administrative services like TriNet, to get more niche data.

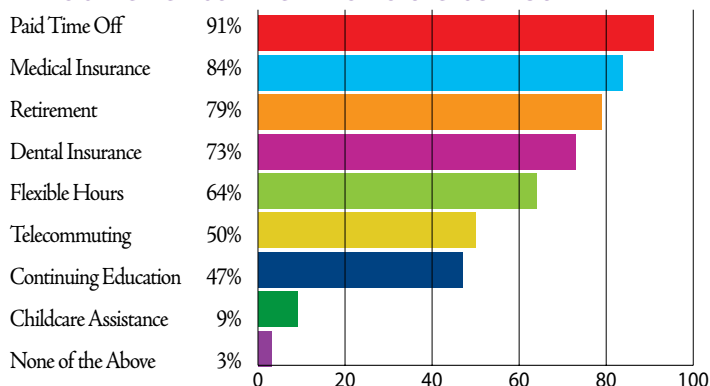
AUGI 2020 Salary Survey

COMPANY DATA

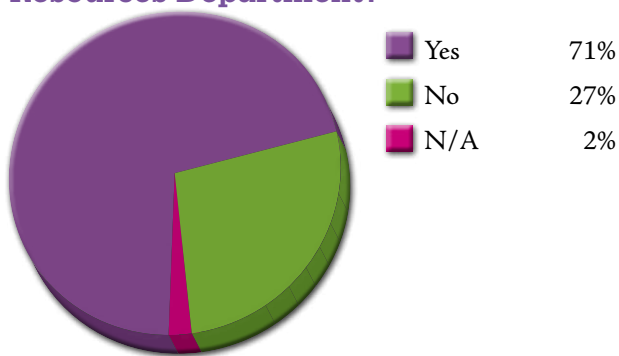
Change in Employment?



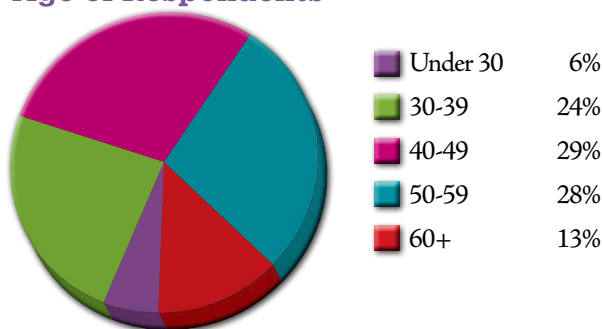
What Benefits Are Available to You?



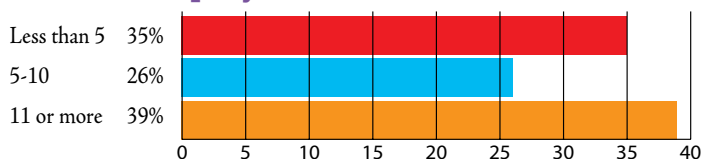
Does Your Company Have a Human Resources Department?



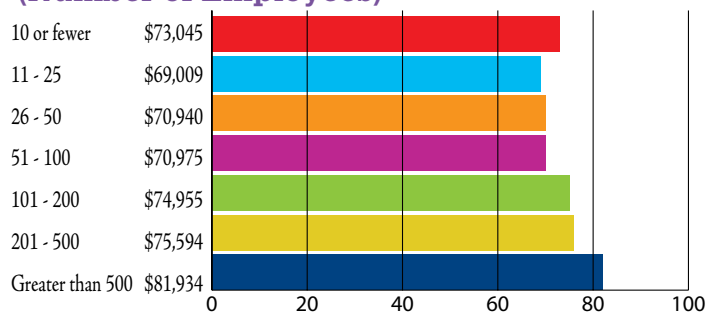
Age of Respondents



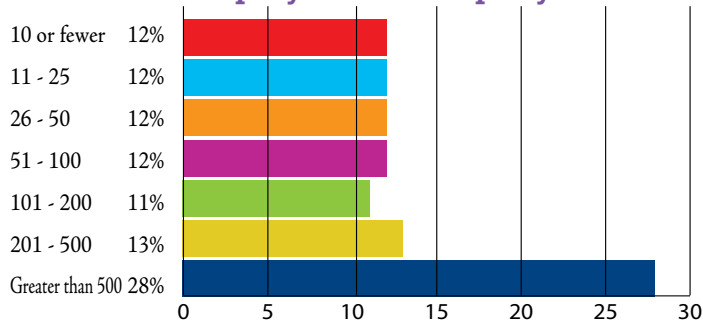
How Many Years Have You Worked for Your Current Employer?



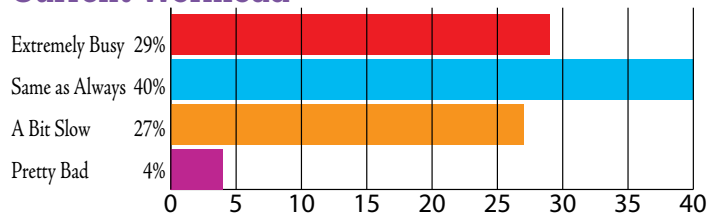
Average Pay by Company Size (Number of Employees)



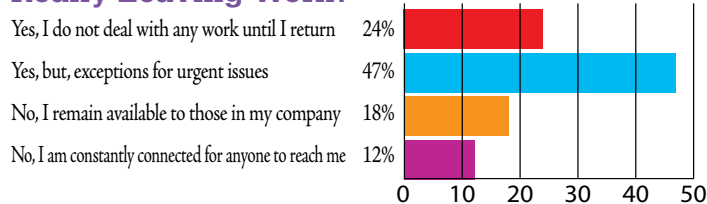
Number of Employees in Company



Current Workload



When You Leave for the Day, Are You Really Leaving Work?

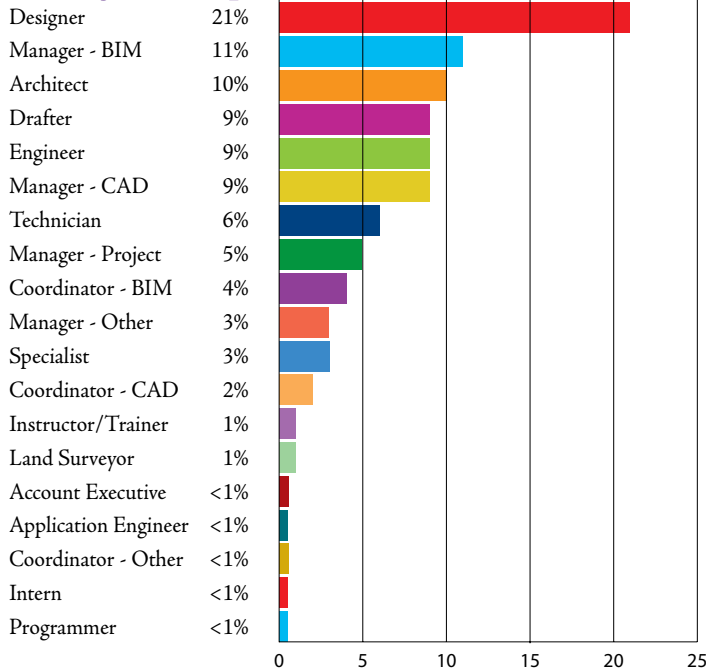


The ability to telecommute increased to 50% from 28% last year.

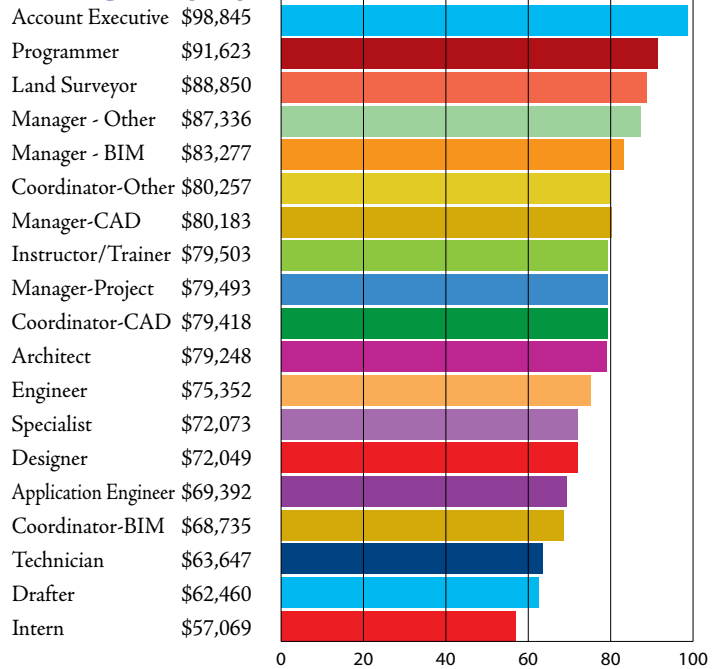
That is a big jump over the 15% who reported this benefit a decade ago.

JOB TITLES

Survey Participants

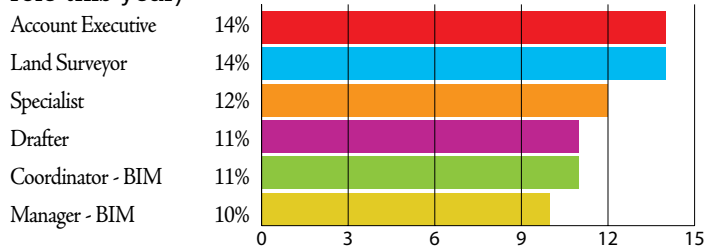


Average Pay by Job Title

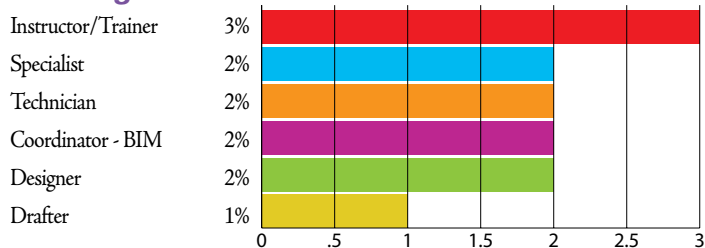


Jobs with the Highest Mobility

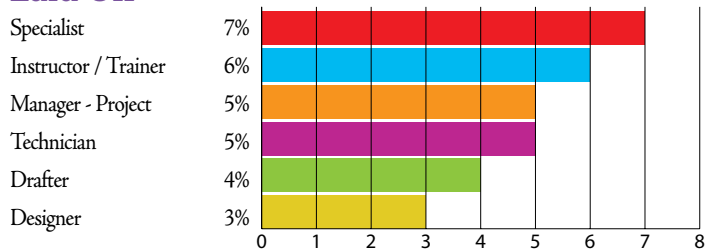
(percentage of each title who reported being in a new role this year)



Percent of Each Job Title who were Furloughed

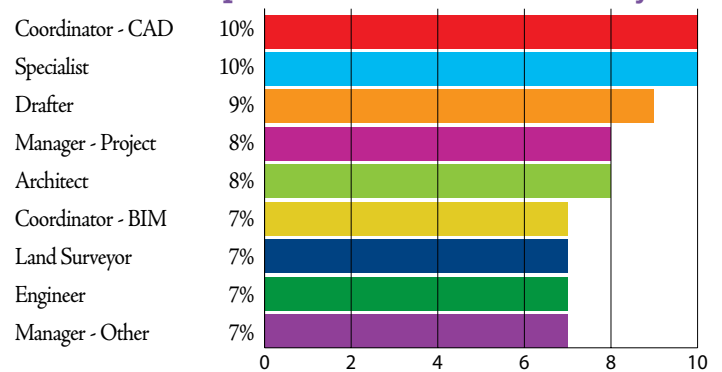


Percentage of Each Job Title who were Laid Off

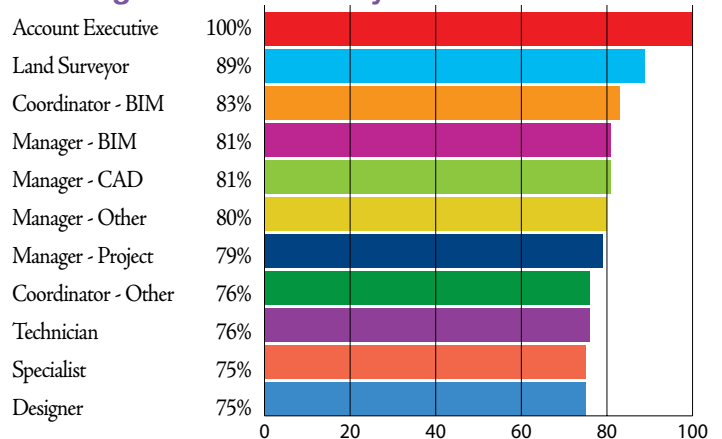


Reminder: All reported average pay is based upon a 40 hour workweek. It would include potential bonuses, but, is calculated to exclude overtime pay.

Users Who Experienced a Decrease in Pay



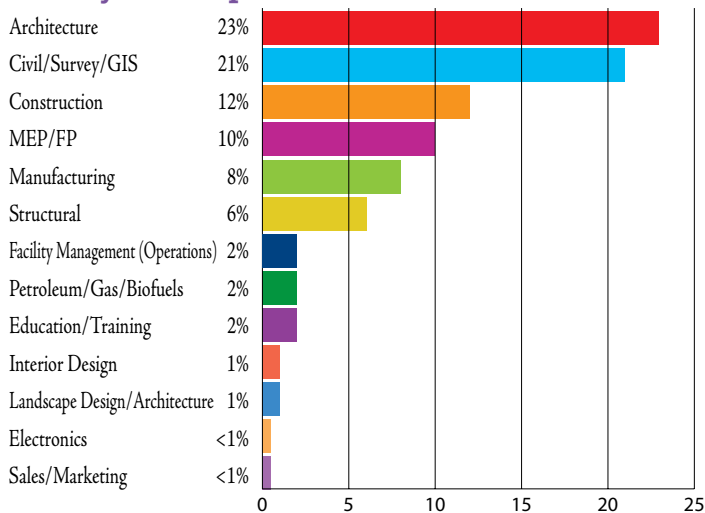
Feelings of Job Security



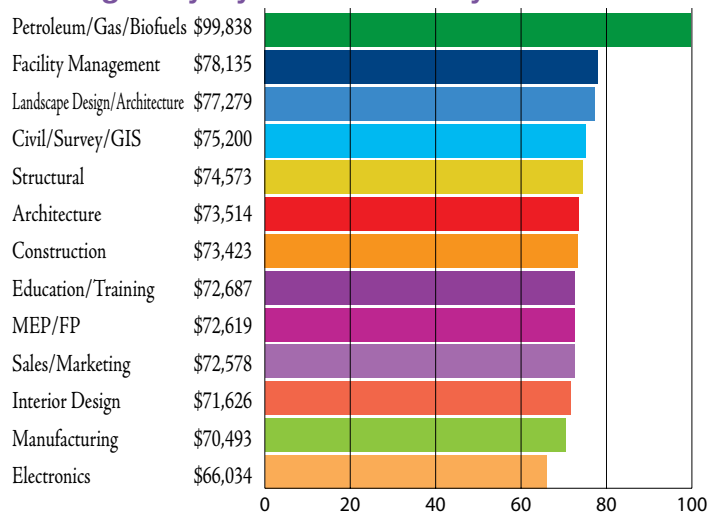
AUGI 2020 Salary Survey

INDUSTRY/DISCIPLINE

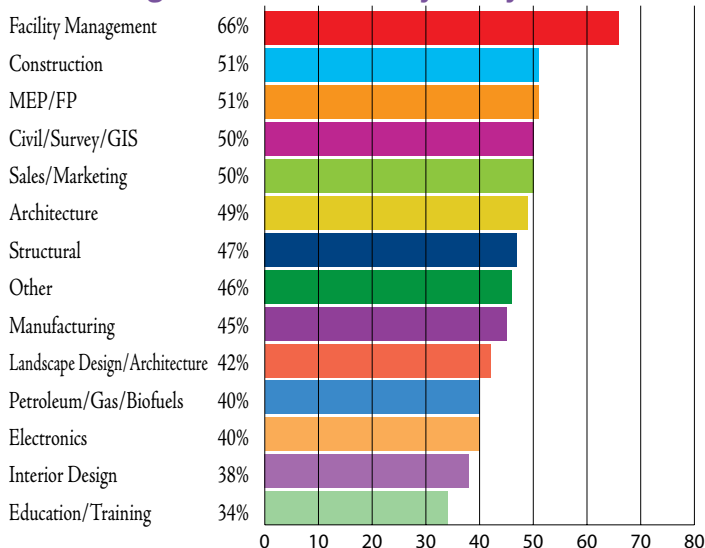
Survey Participants



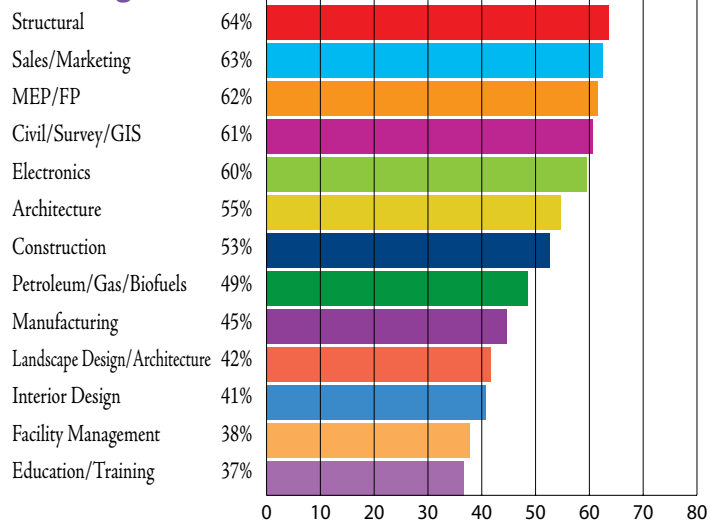
Average Pay by Field/Industry



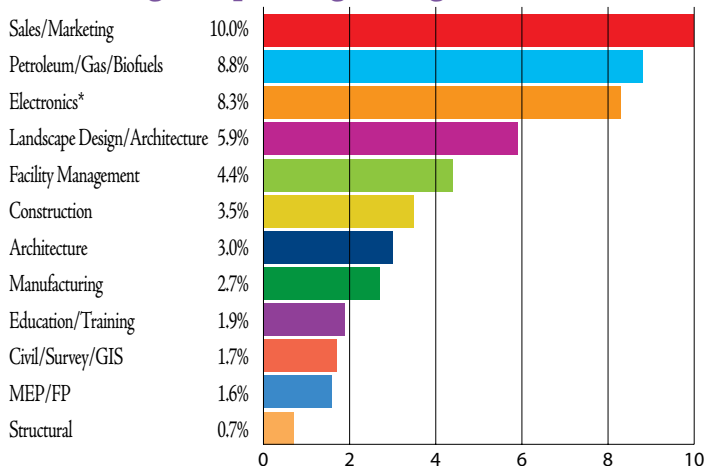
Percentage with Extremely Busy Workload



Percentage of Each Industry Reporting Staffing Increases



Percentage Reporting Being Laid Off



*low response rates for this industry will result in skewed numbers that are not statistically significant.

The average age of an AUGI member is 47.

Fields with higher than average ages are Landscape Design/Landscape Architecture and Manufacturing.

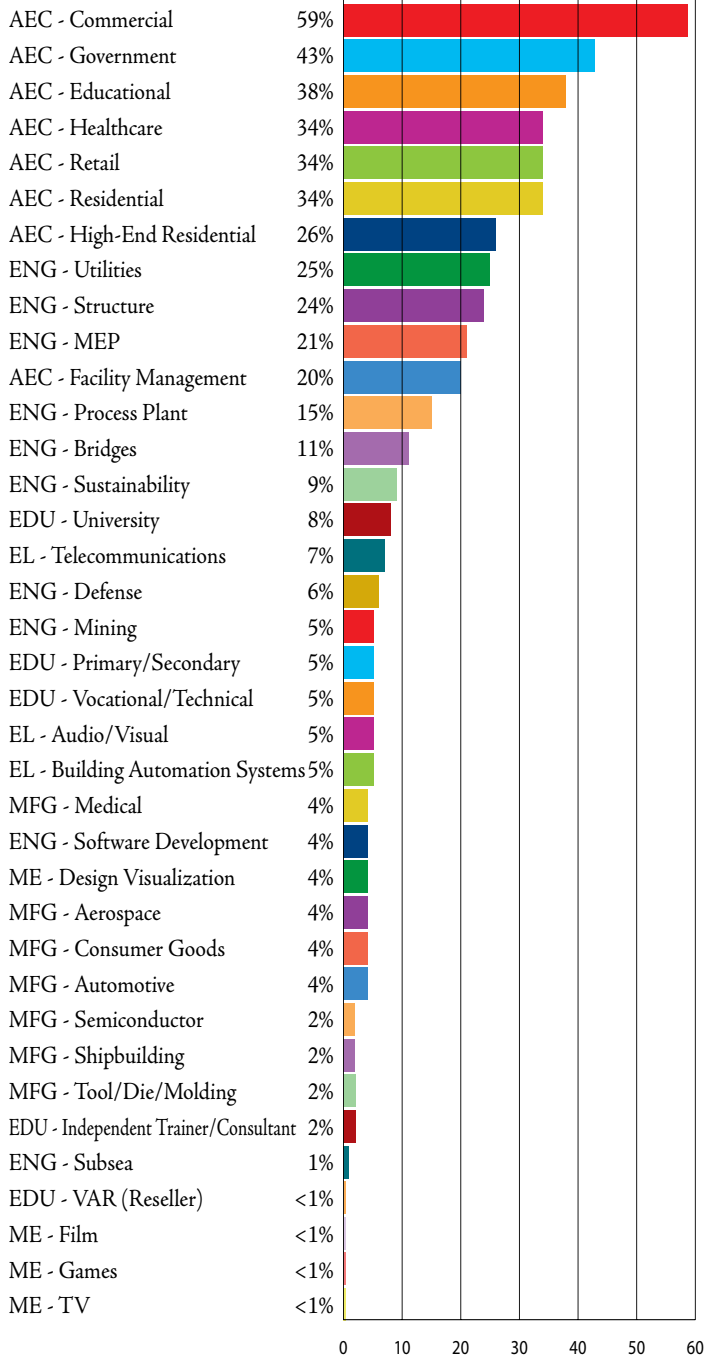
Is your company tackling the idea of succession and knowledge documentation?

18% of the industry is female.

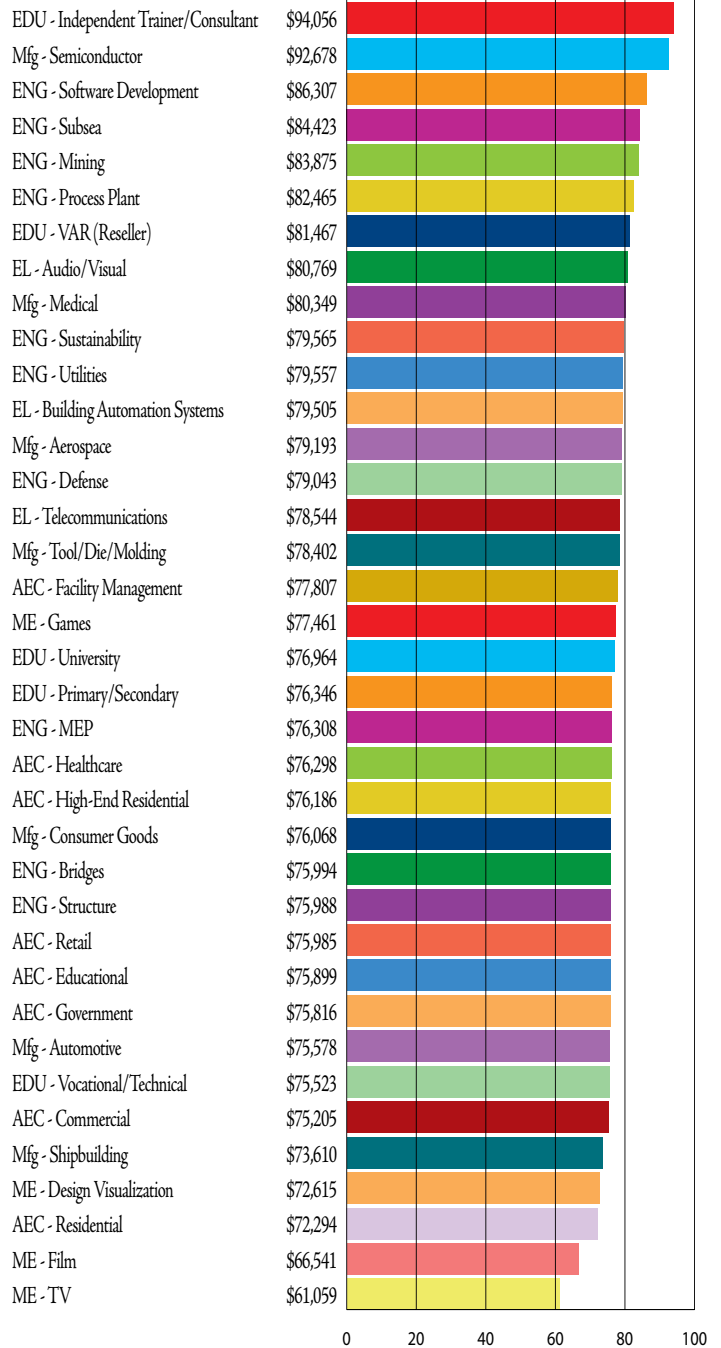
Fields with lower than average representation are Construction, Structural, Civil, Manufacturing, and Fuels.

MARKETS SERVED - INDUSTRY SPECIALTIES

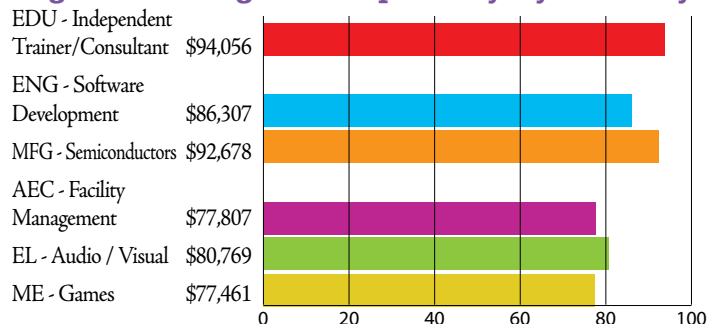
Size of Market Segments



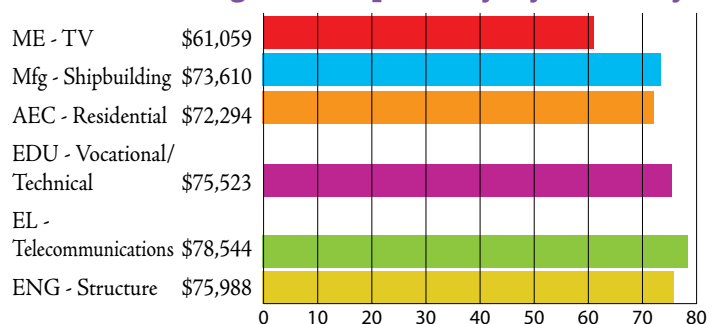
Average Pay of Market Segments



Highest Average Paid Specialty by Industry



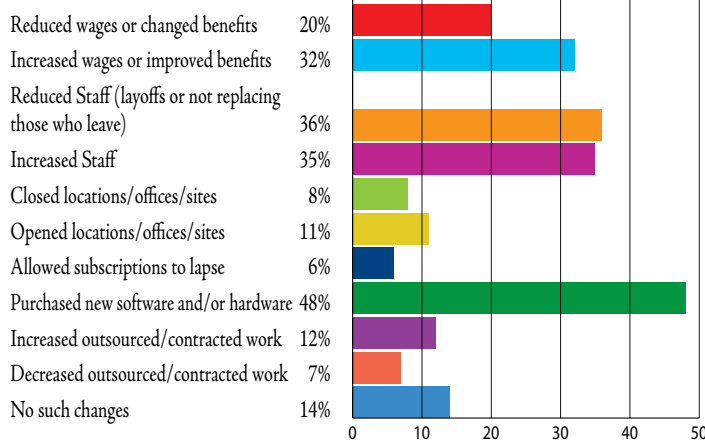
Lowest Average Paid Specialty by Industry



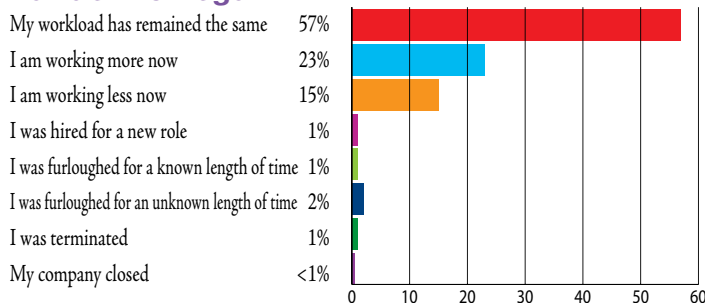
AUGI 2020 Salary Survey

HOT TOPICS

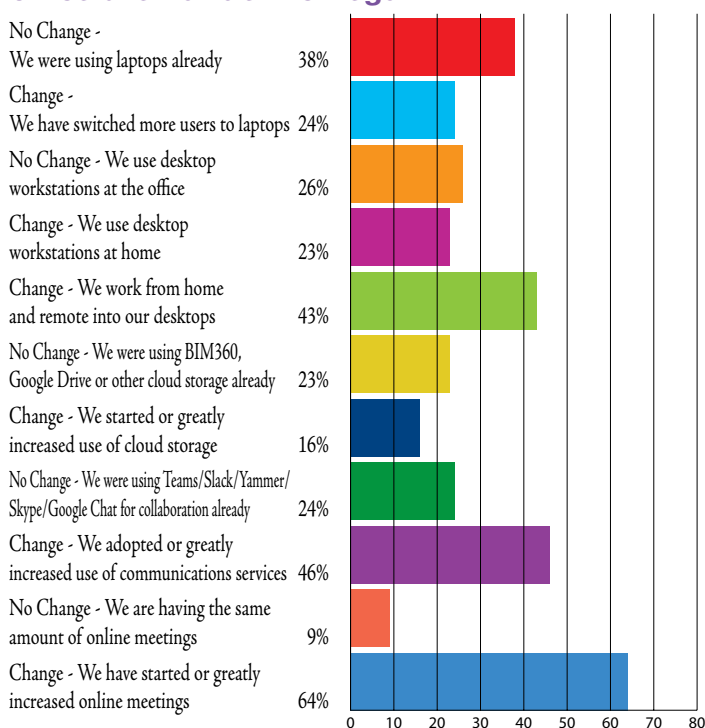
Has Your Company Done Any of the Following in the Past Year?



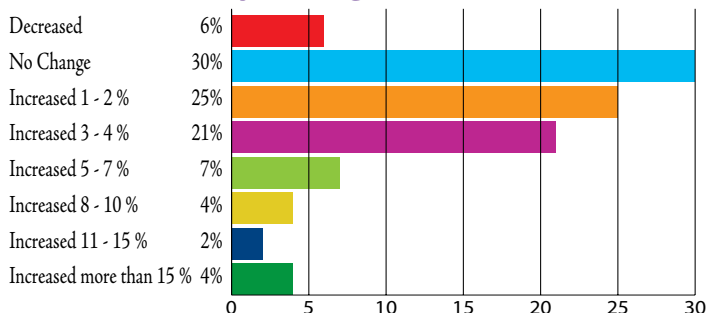
How Has Your Workload Changed Since the Pandemic Began?



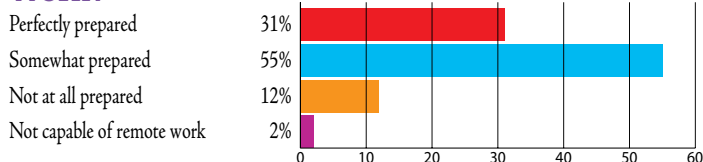
How Has Your Technology Usage Changed Since the Pandemic Began?



Has Your Salary Changed in the Past Year?



How Prepared was Your Team for Remote Work?

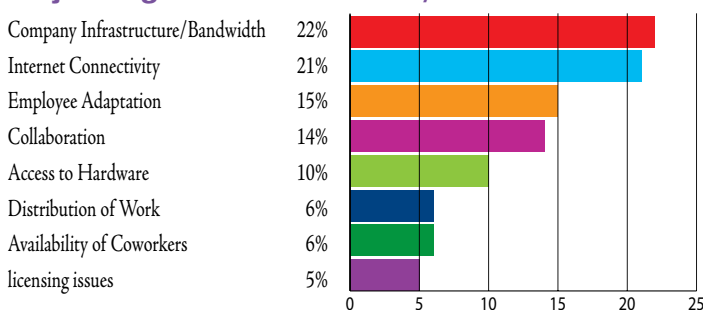


For those whose teams had difficulty adapting to remote work, the number one and number two issues cited were:

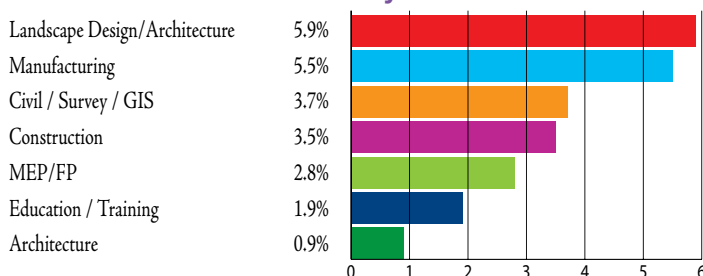
**Company Infrastructure/
Bandwidth - 29%**

Internet Connectivity - 21%

For Those Users Who Experienced Pains Adjusting To Remote Work, The Issues Were:

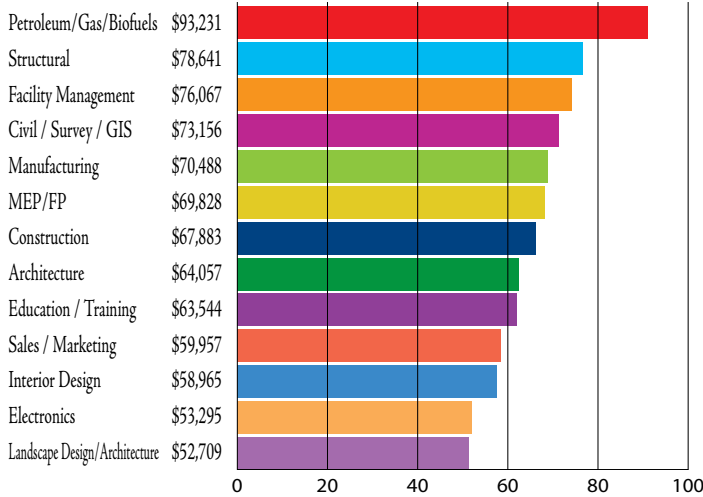


Percentage of Industries Who Report Being Unable to Work Remotely



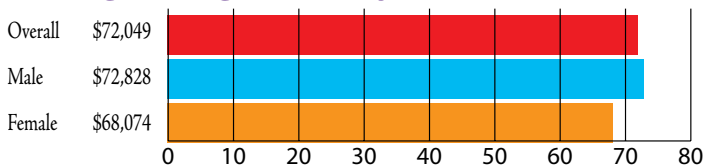
DESIGNER CLOSE-UP

Average AUGI Designer Salary by Industry

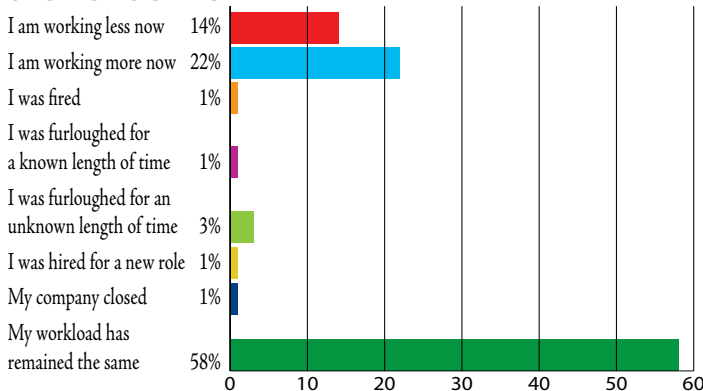


Designers have spent an average of 11 years working with their current company.

Average Designer Salary



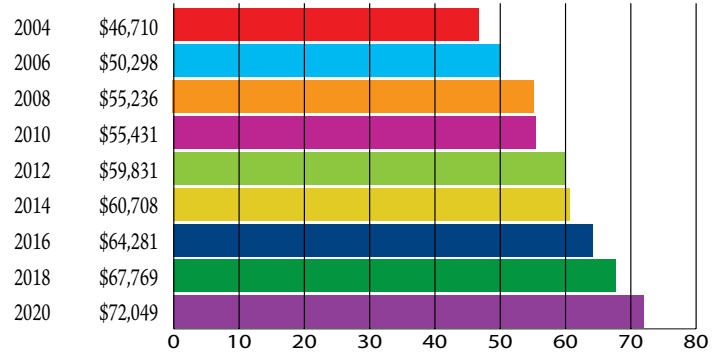
How Has Your Workload Changed Since the Pandemic?



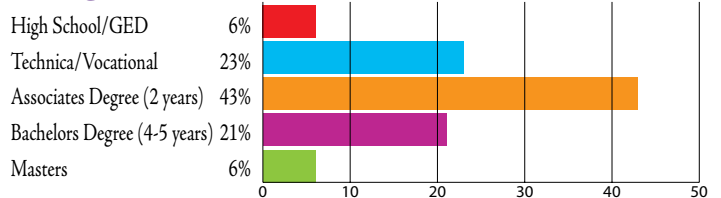
66% of Designers can work flexible hours.

29% of Designers rate their workload as Extremely Busy, an 11% decrease from last year.

Historical Average Designer Pay



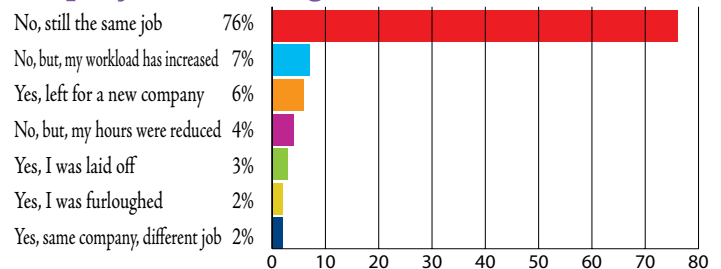
Designer Education Levels



Average age of Designers is 48.

49% of Designers report the ability to telecommute, which has doubled since last year.

Employment Change in the Past Year



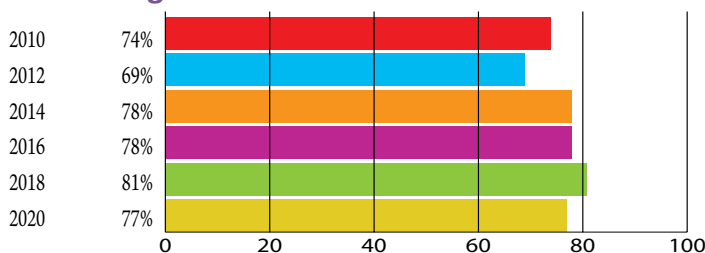
Average designer has 22 years of experience in the industry.

75% of designers feel Secure in their jobs, which is only a 4% drop from last year.

AUGI 2020 Salary Survey

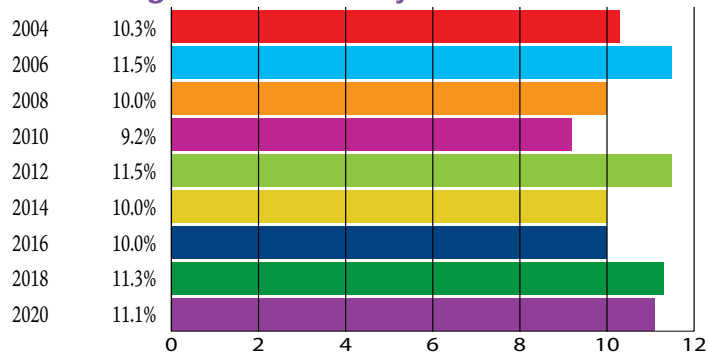
A LOOK BACK

Percentage of Users Who Feel Secure



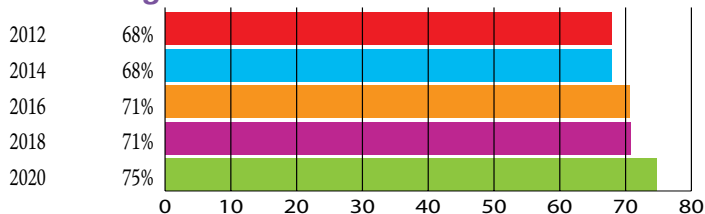
* these numbers reflect a 40 hour workweek

Percentage of Gender Pay Difference

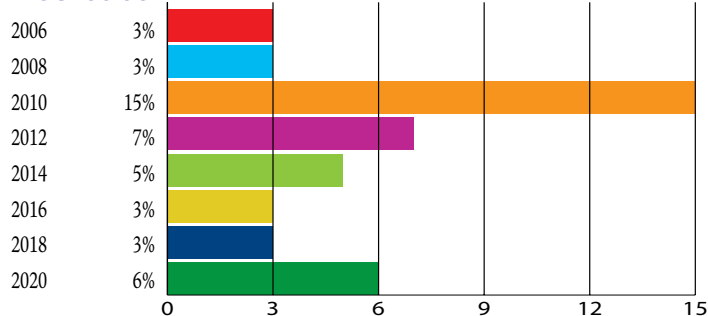


* these numbers reflect a 40 hour workweek

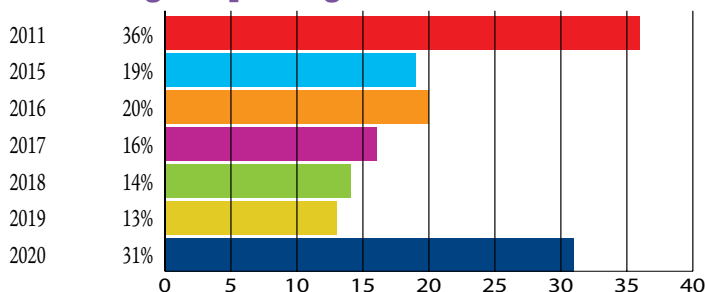
Percentage of Users Who Are Satisfied



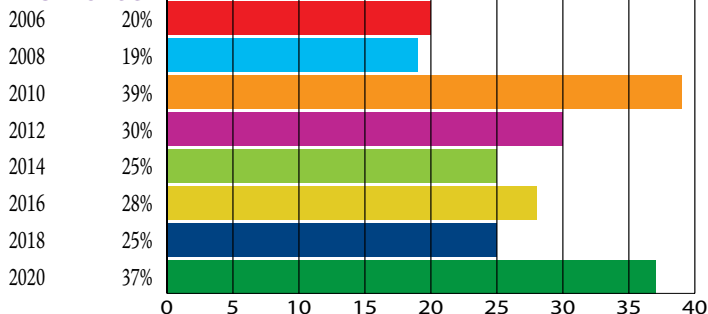
Percentage Who Experienced a Pay Decrease



Percentage Reporting Poor Workload



Percentage of Respondents Who Received No Raise



While the percentage of Designers has remained steady over the years, the volume of members with the job title of Drafter has shrunk from 28% in 2002, to just 9% today.

How has your job title shifted over the years?

The number of people who do not work outside of office hours has fallen a further 6% this year.



Melanie Stone is a CAFM/IWMS Specialist supporting ARCHIBUS, FMInteract, Tririga or similar. She served as an AUGI Director/Officer for over 6 years and is currently involved with the STLRUG. Melanie can be reached at mistressofthedorkness@gmail.com or found on Twitter as @MistresDorkness

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FINDCAD

<https://apps.autodesk.com/RVT/en/Detail/In dex?id=7656171246590116444&appLang=en &os=Win64>



Autodesk Revit: 2021, 2020, 2019, 2018

FindCAD plugin enables Autodesk® Revit® users to find and display all Autodesk® AutoCAD® links/imports information with a single click. It also enables the user to purge all AutoCAD links/imports from a project.

PIPE NETWORK CATALOG FOR EU MARKET

<https://flowbim.ee/>

Autodesk® Civil 3D®: 2021, 2020, 2019, 2018

Autodesk® Civil 3D® Pipe Network catalog to be used in EU countries (most applicable). Components include additional information about its manufacturer, but this is not included into the component name (For example, DN200 pipe is used as a pipe name, instead of Pipelife DN200 or Uponor Infra DN200 pipe).

Catalog includes:

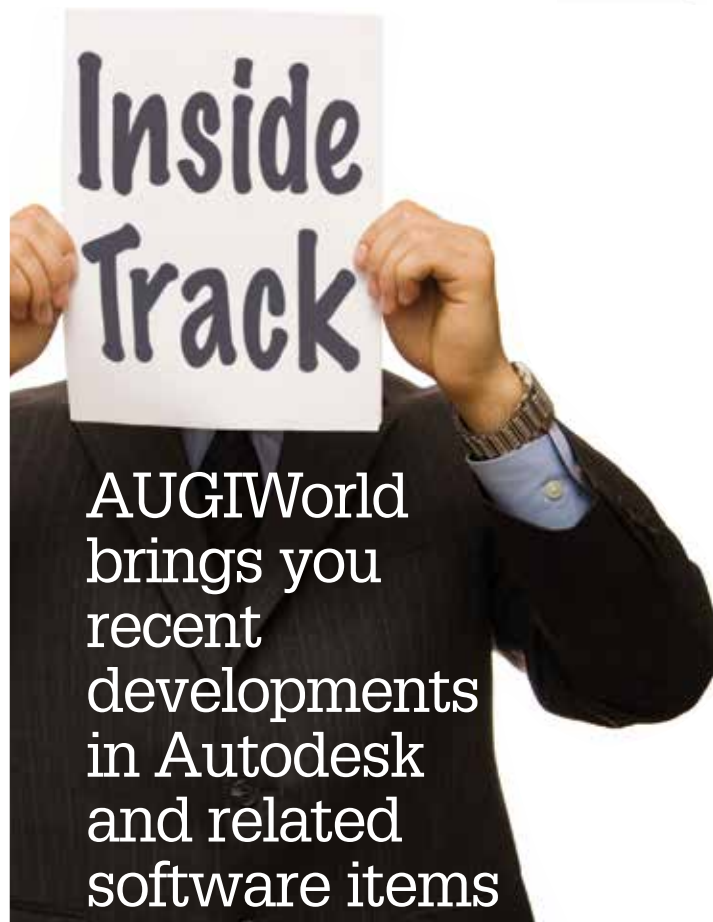
- Pressure class: SN2 – SN20; PN5 – PN40
- Pipe diameters: DN50 – DN3000
- Pipe component identifiable based on its material (ductile iron, PE, PP, PVC)
- Pipe component can be selected based on its connection type (Plain end, Socket, Spigot)
- All components have additional information that can be used in labels
- Components that are included with different pressure ratings, do have different wall thickness (true data).
- About 400 pipes + common manholes (diameter range: 315 - 1600 mm)
- Can be easily combined with your current content

Note: This catalog can be successfully used with Autodesk® Storm and Sanitary Analysis package, because pipes will always be carried over with its real pipe inner diameter value. Pipes general diameter class (DN200) can be used in labels.

Important: Content pack has been tested in Autodesk® Civil 3D® 2015 - 2021. Autodesk® Civil 3D® 2015/2016 users need to install "Autodesk® Civil 3D® Productivity Pack 1" before installing this content package.

Note: This app uses a custom installer (and not the standard App Store installer).

If you have some news to share with us for future issues, please let us know. Likewise, if you are a user of a featured product or news item and would like to write a review, we want to know. brian.andresen@augi.com



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