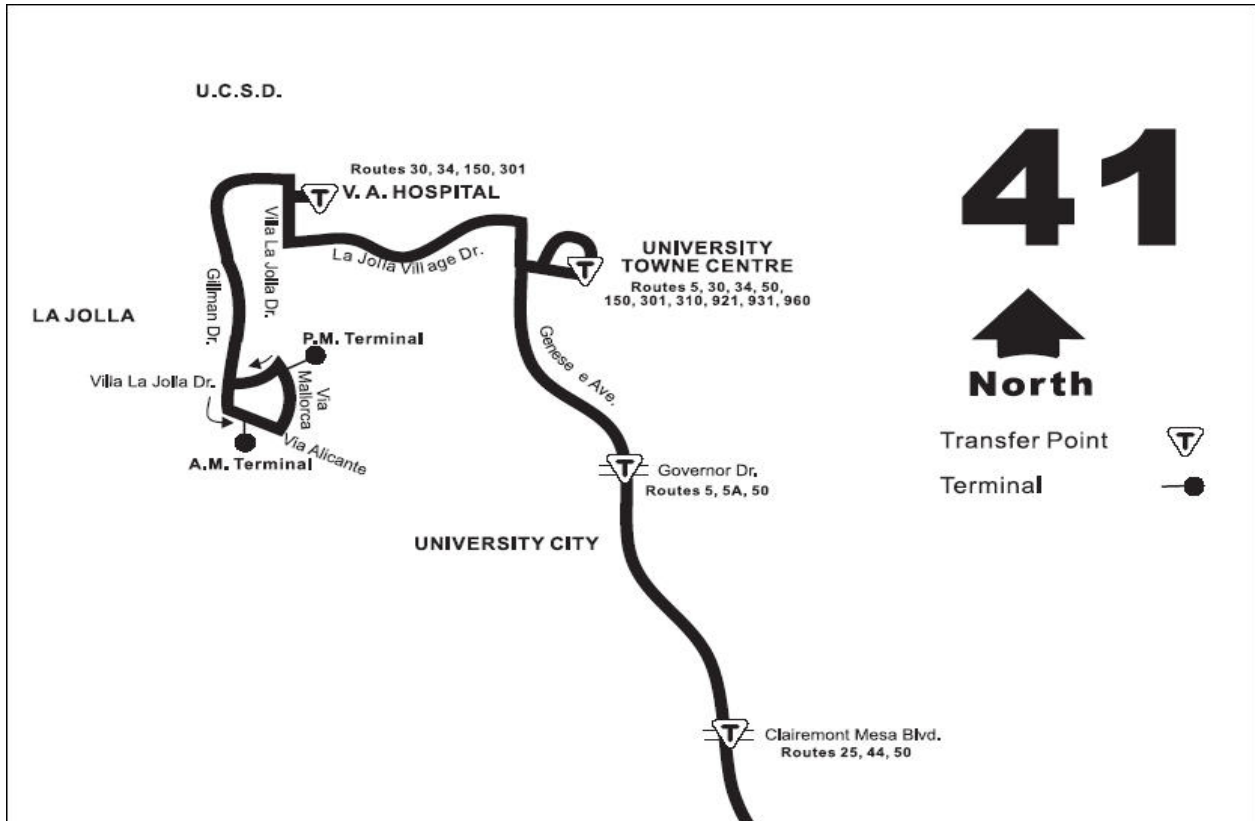


# Information Visualization Redesign

## - Bus Route Map -

### Route 41 Map



The above image is a route map for bus 41, which can be found on the web site [http://www.sdcommute.com/Rider\\_Information/routes/41.asp](http://www.sdcommute.com/Rider_Information/routes/41.asp). This transit travels from UCSD to Fashion Valley (and also in opposite direction), and above image is a part of the whole map which shows the partial route from UCSD to Clairemont Mesa Blvd. To represent more focused and simplified redesign figure, I chose to modify only the part that above image shows.

There are four transfer points specified in the map, i.e. *V.A. Hospital*, *University Towne Centre*, *Governor Dr.*, and *Clairemont Mesa Blvd.* For each point, other buses available at that bus stop are also specified (ex. Routes 30, 34, 150, 301 at V.A. Hospital). To give a clear and simple view of the map, bus stops other than these transfer points are not shown. Users can intuitively conjecture the locations of other bus stops which would be intermediate points among transfer points.

There are several functions of information visualization, such as to record information, to provide interactive processing of information, and to present information for sharing and

collaboration. The function of this information visualization (route 41 map) is to present useful information to almost any possible users regardless of their age, gender, or educational background. The main purpose is to let user capture information as quickly and easily as possible. This is strongly related to the “information cost structure”. The value of information must be greater than the cost of obtaining it and this means that the process of attaining information should be fast and easy. To lower the cost, this map shows simplified, exaggerated, and distorted route depiction. User can capture his or her traveling route by viewing this map and can aware the direction to which he or she must go. In addition, by referring to other buses specified on each transfer point, user can take other transits in case bus 41 is not available.

On the back of this map, there is a time table for bus 41 (see the image below). It shows the time when bus 41 stops at each transfer point. The table is categorized by direction as “Fashion Valley to UCSD” and “UCSD to Fashion Valley”. For each category, there is a list of transfer points in a row and the arrival times in columns. User should refer to both map and time table to know when and where the bus will arrive.

ALTERNATE FORMATS ARE AVAILABLE UPON REQUEST													
Fashion Valley to UCSD							UCSD to Fashion Valley						
Monday through Friday													
Fashion Valley Transit Center	Geneesee Ave. & Balboa Ave.	Geneesee Ave. & Governor Dr.	University Towne Centre	V.A. Hospital	Via Alicante & Gilman Dr.	Via Mallorca & Villa La Jolla Dr.	Via Mallorca & Villa La Jolla Dr.	Via Alicante & Gilman Dr.	V.A. Hospital	University Towne Centre	Geneesee Ave. & Governor Dr.	Geneesee Ave. & Balboa Ave.	Fashion Valley Transit Center
5:34a	5:48a	5:57a	6:01a	6:11a	6:17a	---	---	5:43a	5:51a	5:59a	6:05a	6:13a	6:25a
5:49	6:03	6:12	6:16	6:26	6:32	---	---	6:12	6:20	6:28	6:34	6:42	6:54
6:04	6:18	6:27	6:31	6:41	6:47	---	---	6:26	6:35	6:43	6:50	6:58	7:10
6:19	6:33	6:42	6:46	6:56	7:02	---	---	6:39	6:48	6:58	7:05	7:13	7:25
6:34	6:48	6:57	7:01	7:11	7:17	---	---	6:54	7:03	7:13	7:20	7:28	7:40
6:49	7:06	7:16	7:21	7:33	7:39	---	---	7:09	7:18	7:28	7:35	7:43	7:55
7:02	7:19	7:29	7:34	7:46	7:52	---	---	7:26	7:35	7:45	7:52	8:00	8:12
7:17	7:34	7:44	7:49	8:01	8:07	---	---	7:41	7:50	8:00	8:07	8:15	8:27
7:32	7:49	7:59	8:04	8:16	8:22	---	---	7:55	8:04	8:14	8:21	8:30	8:42
7:47	8:04	8:14	8:19	8:31	8:37	---	---	8:08	8:18	8:28	8:35	8:44	8:57
8:02	8:19	8:29	8:34	8:46	8:52	---	---	8:38	8:48	8:58	9:05	9:14	9:27
8:20	8:37	8:47	8:52	9:04	9:10	---	---	9:08	9:18	9:28	9:35	9:44	9:57
8:35	8:52	9:02	9:07	9:19	9:25	---	---	9:38	9:48	9:58	10:05	10:14	10:27
8:50	9:07	9:17	9:22	9:34	9:40	---	---	10:08	10:18	10:28	10:35	10:44	10:57
9:05	9:22	9:32	9:37	9:49	9:55	---	---	10:38	10:48	10:58	11:05	11:14	11:27
9:35	9:52	10:02	10:07	10:16	10:22	---	---	11:08	11:18	11:28	11:35	11:44	11:57
10:05	10:22	10:32	10:37	10:46	10:52	---	---	---	---	---	---	---	---
10:35	10:52	11:02	11:07	11:16	11:22	---	---	11:33	11:43	11:53	12:04p	12:14p	12:27p
11:05	11:22	11:32	11:38	11:47	---	11:54a	12:05p	---	12:13p	12:23p	12:34	12:44	12:57
11:35	11:52	12:02p	12:08p	12:17p	---	12:24p	12:35	---	12:43	12:53	1:04	1:14	1:27
12:05p	12:22p	12:32	12:38	12:47	---	12:54	1:01	---	1:09	1:19	1:30	1:40	1:53
12:35	12:52	1:02	1:08	1:17	---	1:24	1:16	---	1:24	1:34	1:45	1:55	2:08
1:04	1:21	1:31	1:37	1:48	---	1:55	1:32	---	1:40	1:50	2:01	2:12	2:27
1:34	1:51	2:01	2:07	2:18	---	2:25	1:47	---	1:55	2:05	2:16	2:27	2:42
2:04	2:21	2:31	2:37	2:48	---	2:55	2:02	---	2:10	2:20	2:31	2:42	2:57
2:21	2:38	2:48	2:54	3:05	---	3:12	2:17	---	2:25	2:35	2:46	2:57	3:12
2:36	2:53	3:03	3:09	3:20	---	3:27	2:32	---	2:40	2:50	3:01	3:12	3:27
2:51	3:08	3:18	3:24	3:35	---	3:42	3:02	---	3:10	3:20	3:31	3:42	3:57
3:06	3:23	3:33	3:39	3:50	---	3:57	3:27	---	3:35	3:49	4:00	4:12	4:28
3:21	3:38	3:48	3:54	4:05	---	4:12	3:42	---	3:50	4:04	4:15	4:27	4:43
							3:57	---	4:05	4:19	4:30	4:42	4:58

## **Problems with Route 41 Map**

### **(1) No context, only focus**

One of the visualization design patterns is *focus and context*. It means that visualization should highlight regions of current interest, while deemphasizing but *keeping visible* surrounding context. This design pattern can be applied to our route 41 map. The map lacks in context and only shows the route itself, which is the region of interest, i.e. focus. All that it provides as a context is the city or location names such as *U.C.S.D.*, *LA JOLLA*, and *UNIVERSITY CITY*. It is true that if geographic details were presented, user might have been confused because the main task with this map is to know route information limited to bus 41, not the whole traffic information. However, the map fails to properly present context information because some city names are omitted and it is very hard to distinguish location names from transfer point names because font styles and sizes are same. The solution for this problem would be to specify more city names and use different fonts and sizes for location names.

### **(2) Poor text readability**

Texts and numbers are cluttered at each transfer point, especially because of bus numbers specified at each point (ex. Routes 5, 30, 34, 50, 150, 301, 921, 931, 960 in UNIVERSITY TOWNE CENTRE). Moreover, it is hard to distinguish street names and bus stop names because the font sizes are same. For example, Governor Dr. transfer point is not distinguishable from Genesee Ave. Similarly, the part which A.M. Terminal and P.M. Terminal are shown seems complicated because of street names such as Via Alicante, Via Mallorca, and Villa La Jolla Dr. It is necessary to modify font sizes and styles of these names or relocate street names to improve readability.

### **(3) Distracted layout / Hard to locate target information**

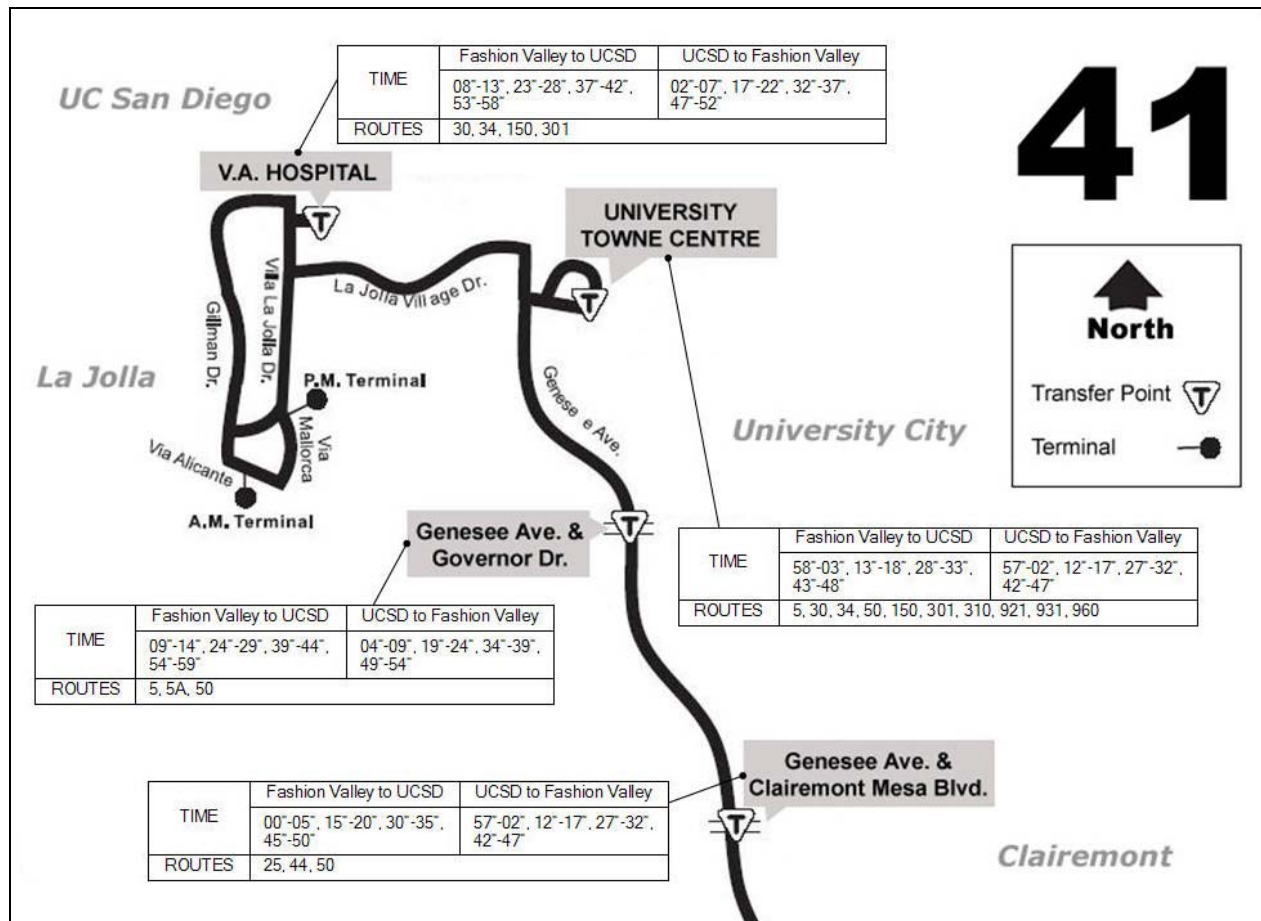
Overall layout is distracted since the texts “41”, “North”, “Transfer Point”, and “Terminal” at the top right side are not clearly distinguishable from route image. It is necessary to group related information and make each group distinguishable from other groups. For example, the texts “41”, “North”, “Transfer Point”, and “Terminal” should be more closely clustered and need to be separated from route image. Also, texts regarding each transfer point should be more tightly clustered and more distinguishable from other information. By grouping closely related information, user can easily locate target information and this improves readability.

### **(4) Difficulty in referring to both map and time table**

It is very inconvenient to refer to both map and time table by alternately turning the map sheet over. In addition, time table is cluttered with numbers and this makes user annoyed to locate a specific arrival time. If map and time table can be viewed in one display, user can find target information more quickly. My suggestion for this problem is to merge map and time table, so that both information can be represented in one sight.

## Redesign and improvements

Following image is the redesigned map which shows both map and time table information.



### (1) Provide both focus and context

The problem with lack of context was solved by giving more attention to location and city name design. By using different fonts, sizes, colors in location names, it is easy to distinguish them from other texts such as transfer point names and street names. I used gray color for location names because these texts must function as *background*, not as main focus in the map and gray colored text is more natural to role as background. Moreover, I added a city name in the map, i.e. Clairemont, which was omitted in the original map. Other design facilities could be added to give more contexts, such as drawing more street lines, including more location names, etc. However, if those figures were added, the overall view of the map could have been too cluttered and confused. So I decided to refrain from putting in more stuffs.

### (2) Use grayscale color to give a clear view

To clearly represent the critical information, i.e. transfer point, transfer point names are labeled in a large enough font to be readable. Using a gray colored dialog box on those names prevents

clutter from the map from obfuscating the text. I decided to adopt gray scale color, rather than using various colors, since main function of this map is closely related to distribution cost. If various colors like red, blue, etc. were used, printing and distribution cost could have been high and this is not acceptable for this kind of map.

### **(3) Change fonts and sizes to improve readability**

To avoid cluttered texts and numbers at each transfer point, some street names were relocated. I extended road line for Villa La Jolla Dr. and relocated that street name. I also eliminated the text “Villa La Jolla Dr.” on the left most side to avoid redundant naming for Villa La Jolla Dr. The text “Via Alicante” is moved from right to left side of the text “A.M. Terminal”. To differentiate street names and bus stop names, bus stop names are represented in bold style with large size. In addition, I modified some transfer point names to be more precise with location information. *Governor Dr.* is modified to *Genesee Ave. & Governor Dr.* and *Clairemont Mesa Blvd.* is renamed to *Genesee Ave. & Clairemont Mesa Blvd.*

### **(4) Adjust layout / group related information**

The texts “North”, “Transfer Point”, and “Terminal” at the top right side are reduced in size and grouped in a dialog box. This accommodates distinction between these texts and route image. Both this dialog box and the text “41” are moved to upper side, improving space usability for route image. By eliminating bus numbers at each transfer point and putting them in tables, information regarding each transfer point is well clustered. Users can locate their target information as quickly as possible by just looking at transfer point name and its table.

### **(5) Provide both map and time table information to accommodate user convenience**

I provided time table information in the map by adopting separate tables for each transfer point. It is very comfortable and convenient to know when and where the bus will arrive. Each table has *time* and *routes* schema. I represented each arrival time using only minutes to avoid cluttered view. Since the arrival times in the original time table have a few discrepancies from time to time, I used range-style presentation to specify each arrival time.

## Concluding remarks

The well-designed presentation of data consists of complex ideas communicated with clarity, precision, and efficiency. Good visualization is that which gives to the viewer the greatest number of ideas in the shortest time with the least ink in the smallest space (*by Tufte*). Tufte's view about information visualization is that visualization should focus on providing only information that user wants. This means that visualization must be simple enough to allow user to find target information as quickly as possible. "*Simple and easy to use*" principle of information visualization can be achieved by trying to focus on the "task" in mind. If a designer concentrates on the task that people do with that visualization product, he or she can be more attentive to effective ways to display target information. This can lead to a successful visualization in that the design will provide a clear and appealing view. In addition, the information cost structure, cost related to acquiring information, would be lowered and this meets Tufte's view in that user can capture ideas in the shortest time.

The original route 41 map design failed in this point that it does not support the main task properly. The main task with this information visualization is to find location of the bus stop and locate arrival time at specific bus stop. However, the map poorly supports this task. During the redesign process, I tried to focus on the task and to think lots of ways to successfully support that task. Being focused on users and their tasks is the most important principle in design process.