Clearview Typeface Supplement

Metric Edition

This submittal is made at the request of the Federal Highway Administration, Office of Transportation Operations in support of a request by the Pennsylvania Department of Transportation for approval to use the Clearview typeface on traffic control devices in lieu of FHWA Standard Alphabets for Traffic Control Devices based on the research of the Pennsylvania Transportation Institute and the Texas Transportation Institute.

September 2, 2004

Clearview Type System for Traffic Control Devices

Credits

The Clearview Type System for traffic control devices was developed by a design team that included Martin Pietrucha, Ph.D. and Philip Garvey of the Pennsylvania Transportation Institute (PTI), Donald Meeker and Christopher O'Hara of Meeker & Associates, Inc., James Montalbano of Terminal Design, Inc., with supporting research by Gene Hawkins, Ph.D. and Paul Carlson, Ph.D. of the Texas Transportation Institute (TTI). Consultation on experimental design was provided by Susan T. Chrysler, Ph.D., formerly with the 3M Company and now with TTI. This type system is designed for signing all streets, highways, and other byways open to public travel.

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Overview: Initial Assumptions & Problem Statement

The Clearview Type System was developed as the result of a research program aimed at increasing the legibility and recognition of road sign legends. The primary goal was to reduce the effects of halation (or overglow) for older drivers and drivers with reduced contrast sensitivity, when letters are displayed using high brightness retroreflective materials. To satisfy these objectives, it was necessary to identify ways to create a typeface that was more effective than E-modified for destination legends on freeway guide signs. A second component of the project was to compare the ease of recognition provided by mixed case displays (initial capital letter only) vs. all uppercase letters (Series D).

The initial research assumption was that four problems with current signage could all be solved with a typeface that was more effective for traffic control devices and guide signs. These problems include the need to upgrade signing to accommodate older drivers; questions about how motorists read sign legends with greatest speed, accuracy, and distance; and adding more information on the roadscape at locations that are currently heavily signed. Specifically:

Figure 1.
An increase of 20 percent in letter height results in a 40-50 percent increase in overall sign area

1) A major FHWA study published in 1994 recommended 20 percent increases in letter height using FHWA Standard Alphabets for Traffic Control Devices to accommodate viewing distance and reaction time requirements of older drivers. This is the 65 and older age group that by 2005 will number 36 million people or about one-fifth of the U.S. driving population. That 20 percent increase in letter height would result in a 40 to 50 percent increase in the overall area of a sign because the width of the panel would be extended as well. The design team theorized that if an appropriate typeface design were developed that could effectively increase legibility distance and recognition distance by 20 percent without an increase in capital letter height, all traffic control devices could be upgraded without the physical requirements for larger signs and sign structures.

2) If use of an optimized mixed case typeface proved more recognizable than all capital letters on guide signs and street name signs, there would be less need to make signs larger to accommodate

Figure 2.
FHWA Series D uppercase vs. Clearview 3-B mixed case.

older drivers while improving the basic performance of the sign.

3) If these typefaces eliminated visual massing of convergent points in strokes or bleeding with adjacent letters, the problems of halation or overglow could be reduced or eliminated for older drivers viewing signs with legends fabricated with high brightness materials on backgrounds with high contrast between legend and background.

Figure 3.
Overglow simulation with E-modified (left), Series D (center), and Clearview 5-W (right)

4) Cities and states are attempting to place more information on the roadscape for tourism-related activities as well as adding regulations, and signing for pedestrian safety in areas that are already densely packed with assemblies of guide and regulatory panels. If guide signs are improved, and the installations made more modular in design, the appearance of sign clutter may be reduced while increasing overall effectiveness of the collective installation.

Solving each of these problems was contingent on improving the legibility, recognition, and ease of understanding of road sign typography and providing a more consistent integration of sign components.

This typographic development program has taken nearly ten years and has included five separate, multi-part research studies by PTI and TTI. The final version of the typefaces, as shown in this document, evolved from these studies. Field reviews of the final versions indicate that Clearview should result in a greater than 20 percent gain in legibility and recognition distance in each weight at the same capital letter height as Standard Highway Alphabets, while minimizing halation.

The following section describes the research and the evolution of the Clearview typeface design that has culminated in this interim adoption. As research is completed, legibility and recognition indices (reading distance as a function of capital letter height) will be incorporated into this supplement.

Design Development

In the preliminary research plan, it was assumed that the comparison typeface would be an existing sans serif typeface based on a European example. Though many clearly proportioned typefaces were reviewed - Syntax, Avenir, Thesis, Frutiger, British Transport, Normschrift, Univers, etc. - none provided an acceptable comparison to the standard highway fonts based on stroke, letter width, open shape of counters, and neutrality in character. A simple looking typeface was desired, but one with character and a subtle differentiation between letters to aid word recognition.

Based on these requirements, the project team began by designing two mixed case typefaces that were similar in weight to Series D and Series E-modified. The letter designs were prepared using a series of proportional templates that were not based on other typefaces, but included attributes to aid viewing from long distances. To minimize halation, special emphasis was given to the design of the most critical lowercase letters “a, e, and s,” the design of the counters (interior shapes of letters), the relationship of ascender to the lowercase “x,” and the geometry of the stroke convergence. The resulting designs were two typefaces: Clearview-Bold (a full width version) and Clearview-Condensed (a narrower version).

The experimental design plan included legibility and recognition tests to accommodate both the known and unknown components of guide sign legends. Legibility is the point at which a viewer can read an unknown legend by identifying each individual letter and building the word. The recognition process is the marriage of the viewer's mental picture of a destination name and the physical word on the sign. For guide signs or street name

signs, recognition is often more important because a viewer is looking for a specific name. Research has shown that recognition distance with mixed case legends is twice the legibility distance.

After an experimental design was developed by the research team, subjects viewed actual sign panels on the PTI test track. These studies, in which half of the subjects were older drivers, used real words with three distinct patterns of ascenders and descenders, and with the necessary complexity to test a viewer's ability to recognize word patterns using both Clearview and FHWA Standard Alphabets. Viewers were asked to read signs from a car moving slowly toward the panels in the legibility studies, or were asked to identify the position of a target word on a panel containing three words to test for recognition.

Results of Research & Evolution of the Design

In two PTI studies of conventional road guide signs *(Figure 4)*, use of an early version of Clearview-Bold (left position) improved nighttime sign reading distance by up to 16 percent when compared with E-modified (right position). For drivers traveling at 45 mph, that legibility enhancement could easily translate into 80 extra feet of reading distance, or a substantial 1.2 seconds of additional reading time. On a road with a posted speed limit of 45 mph, a driver is traveling at 66 feet per second. With Clearview-Bold, the desired destination legend is recognized 1.3 seconds earlier (84 feet)

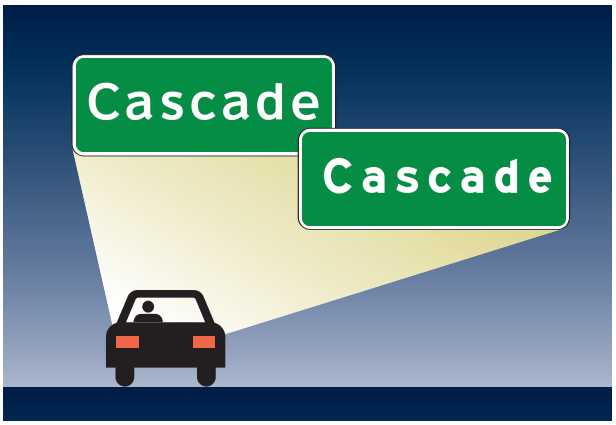


Figure 4.
Clearview-Bold (left) vs FHWA Standard Alphabets Series E-modified (right)

Figure 5.
Clearview-Condensed (upper) vs FHWA Standard Alphabets Series D (lower)

and with greater accuracy, giving the driver significantly more time to react to the information displayed.

The research *(Figure 5)* revealed that when the mixed case Clearview-Condensed (upper position) is compared to the most commonly used all-capital-letter typeface (FHWA Series D, lower position), there was a 14 percent increase in recognition distance when viewed by older drivers at night, with no loss of legibility. When the size of Clearview-Condensed was increased by 12 percent to equal the overall footprint of the uppercase display, the recognition gain doubled to 29 percent with little change in overall sign size. By allowing a viewer to read the unique footprint of the word when displayed in mixed case letters, there is an increase in accuracy, viewing distance, and a reduction in reaction time.

Based on PTI research, TTI elected to compare Clearview-Bold to E-modified on full-scale side-mounted and overhead-mounted freeway guide signs. In a preliminary field review *(Figure 6)*, Meeker, Chrysler, and Garvey found significant differences when viewing Clearview-Bold at a 16 inch capital letter height compared to Clearview-Bold at 5 to 8 inches as used in the PTI tests. In essence, scale and viewing distance had a large impact on legibility, and the typeface was not as readable at the longer threshold distances found with 16 inch letters. As a result, proportional refinements were made to the typeface before test-

Figure 6.
Testing of Clearview at Texas Transportation Institute

ing to expand the counters and reduce the massing at points of convergent strokes *(Figures 8b and 8c)*. The first TTI study using beaded Type II sheeting showed that Clearview performed no worse than Series E-modified, and in some cases Clearview outperformed E-modified. A follow-up study by TTI using microprismatic Type VIII sheeting showed a 12 percent increase in legibility for overhead and shoulder-mounted guide signs with Clearview. In this follow-up study, the largest legibility distance improvements of the Clearview alphabet were associated with older drivers.

One of the problems with E-modified *(Figure 8a)* is that the heavy stroke width to height ratio (1:5) of the letterforms make the letters read as a dense mass when viewed from long distances. Although the original Clearview-Bold designs *(Figure 8b)* tested much better than existing FHWA typefaces, the design team did not believe that the letterform design would accommodate a stroke width to height ratio heavier than 1:5.5 without beginning to replicate some of the deficiencies that existed in E-modified.

However, a method for adding weight without bulk came as a result of a project to develop a new road guide sign typeface for the National Park Service (NPS) that members of the Clearview design team developed *(Figure 7)*. The goal was to design a Roman typeface to replace Clarendon typeface used on NPS guide signs. The intention was to design a roman style typeface (with serifs) that would occupy less width on the sign, while

Figure 7.
NPS Roadway (top) compared to Clarendon (bottom).
The NPS Roadway reduces legend length between 10-15 percent while increasing readability by 11 percent

improving legibility and recognition for older drivers. To optimize the typeface (named NPS Roadway), the height of the lowercase was increased and the width of the letterforms was compressed. Based on these modifications, the letterforms could be made slightly bolder without increasing the overall footprint (size) of the word. In a field study conducted by PTI, this new design resulted in an 11 percent increase in legibility distance while requiring 11.5 percent less length for the tested words when compared to the original Clarendon typeface.

Based on the findings from the NPS study, the same design concepts, which included a taller lowercase, were incorporated into the Clearview typeface design *(Figure 8d)*. The new proportions allowed refinements that were not previously possible, including an increase of the stroke width by nearly 8 percent to 1:5.1 for the version of Clearview being compared to E-modified. The performance of the new Clearview when compared to Clearview-Bold was very encouraging. Based on this result, the Clearview Type System was developed with six weights in both positive contrast (light letters on a darker background) and negative contrast (dark letters on a lighter background) versions for a review by a panel of experts.

These new Clearview designs were viewed (May 2002) by federal and state traffic engineers and vision specialists using sign panels with 6 inch and 10 inch legend sizes at PTI's test track. This review compared the new Clearview Type System

to E-modified and included field reviews of the other weights in comparison to the comparable weights of the FHWA Standard Alphabets. The displays were in both positive and negative contrast and used all standard FHWA color combinations on high brightness sheeting materials. The twenty members of the viewing committee concurred that the performance of each Clearview display was significantly better than the FHWA standard control samples.

8a. FHWA Standard Alphabet E-modified as developed in 1949-50 by Theodore Forbes for CalTrans (1:5 stroke width to height ratio) and later adopted in the 1958 AASHTO Manual for Interstate and Defense Highways.

8b. Original design: Clearview Bold as used in the first studies by PTI. (1:5.6 stroke width to height ratio)

8c. Upgraded design: Clearview Bold (1:5.5 stroke width to height ratio) as upgraded for the TTI study of application for freeway guide signs. Changes include 1-5 percent wider letterfoms and 6.6 percent increase in letterspace.

8d. Clearview 5-W: This is the final design as refined based on TTI and PTI research and field review by traffic engineers and human factors specialists. Changes include taller lowercase, ten percent wider stroke width of letter (1:5.1 stroke width to height ratio) and refined letterspacing. Based on this design, the final Clearview Type System as shown in this supplement was completed including 6 weights in both positive and negative contrast versions.

Figure 8.
The evolution of the Clearview typeface design is illustrated in this example with the comparison to FHWA Standard Alphabets, Series E-modified

Clearview 1-W

Clearview 1-B

Clearview 2-W

Clearview 2-B

Clearview 3-W

Clearview 3-B

Clearview 4-W

Clearview 4-B

Clearview 5-W

Clearview 5-B

Clearview 6-W

Clearview 6-B

Figure 9.
The Clearview Type System with the new Clearview 6-W and 6-B weights designed for freeway signs over bifurcated lanes that require significantly greater legibility distance without increasing capital letter height, and where sign width is not a constraint.

The Clearview Type System

Clearview was designed for optimal legibility and has a different visual structure than the FHWA Standard Alphabets. The Clearview lowercase is taller, interior shapes of letters are more open to allow clear definition of each letter, and letterspacing has been designed to accommodate the needs of older drivers when used with both regular and high brightness sheeting materials. Other features designed to enhance word contrast include capital letters B, D, P, and R that break the top of the line *(Figure 10)*. The lower case letters are drawn to afford clear definition of letterforms when viewed from a long distance. The ascenders of lowercase b, d, f, h, i, j, k, and l extend above the top of the initial capital letter to enhance word contrast. The lower case "l" includes a hooked-terminal to distinguish it from a halated lower case "i" and decrease visual vibration when displayed in series with other vertical stroke letters. The descending lowercase letters, including the "g," have been designed with the main loop placed above the baseline to allow full definition of the descending tail. Round or loop letters extend slightly below the base line and above the x-height for lower case letters, and above the nominal cap-height for upper case. All of these nuances are inherent to the design and to each respective version of the typeface in the Clearview Type System.

Clearview is designed for mixed case applications. The new Clearview Type System is provided in six weights *(Figure 9)*. Each weight is specified with two versions: one for use in positive contrast ("W" - white) applications, and one for use in negative contrast ("B" - black) applications. By using a slightly heavier stroke width, the negative contrast version is optically adjusted to appear to have the same weight as the positive contrast version.

A chart (lower right) provides a general equivalence guideline between current FHWA Standard Alphabets and the Clearview Type System. All typefaces in the Clearview Type System are displayed in this supplement on five millimeter grids for reference.

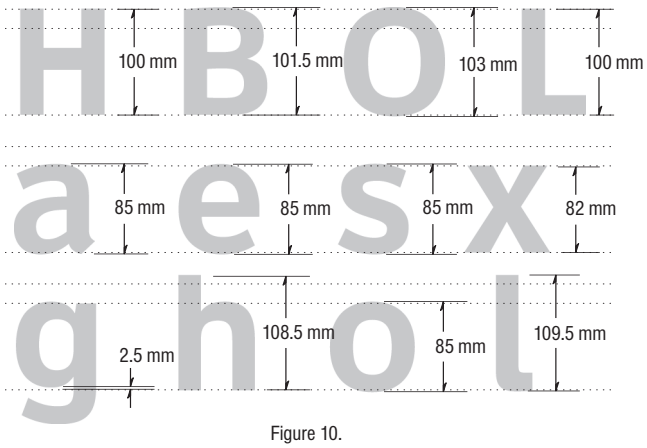


Figure 10.
Geometry of letterforms of the Clearview Type System based on 100mm capital letter height

Although there are comparable weights to each of the FHWA series of Standard Alphabets for Traffic Control Devices, the use of Clearview may not be a seamless one-for-one replacement of the existing typeface. The change from all uppercase to mixed case will require interpretation of grid formats.

Certain weights of Clearview require slightly more or less word length when compared to the replaced FHWA font. A comparison is displayed on pages 10-11 of this section based on a full alphabet display *(Figures 14-19)*. Word length comparison will vary slightly depending on word configuration. All letterspaces for the FHWA series shown *(Figures 14-19)* have been prepared letter-by-letter to comply with the 2000 Standard Alphabets charts. For Series B, C, and D, the FHWA uppercase is compared to the mixed case Clearview. Note that the new letter space calculations developed for the Clearview Type System include more space than

FHWA Standard Alphabets	Clearview	Letter Proportion (H:W)	Stroke Width to Height Ratio
Series B	*Clearview 1-W*	*1:.470*	*1:7.8*
	Clearview 1-B	*1:.481*	*1:7.0*
Series C	*Clearview 2-W*	*1:.580*	*1:6.6*
	Clearview 2-B	*1:.601*	*1:6.0*
Series D	*Clearview 3-W*	*1:.686*	*1:5.9*
	Clearview 3-B	*1:.707*	*1:5.7*
Series E	*Clearview 4-W*	*1:.720*	*1:5.6*
	Clearview 4-B	*1:.747*	*1:5.0*
Series E-Mod.	*Clearview 5-W*	*1:.773*	*1:5.1*
	Clearview 5-B	*1:.799*	*1:4.6*
Series F	*Clearview 6-W*	*1:.811*	*1:4.9*
	Clearview 6-B	*1:.830*	*1:4.5*

the lowercase FHWA Series B, C, and D as specified in the 2000 SHS book. This additional space is designed to aid word recognition and legibility when viewed from the appropriate distance.

Letter and Word Spacing: Manual and Computer Based

The Clearview spacing was developed based on controlled review of full-size samples viewed at threshold reading distances to determine spacing for optimal readability for each specific typeface. Based on these designs, reduction of letterspacing to accommodate a specific size sign panel is discouraged because the visual attributes of the typeface in combination with letterspace will be compromised.

A letterspacing table for metric dimensions (mm) is included in this supplement for each version of Clearview.

The principles of calculating letterspaces for Clearview are identical to those specified for FHWA Standard Alphabet Series as show on pages 9-1 to 9-5 of the 2000 Standard Highway Signs book, but the individual dimensions for each letter are different for Clearview and are based on the shape of each letter and its relationship to the adjacent letters. **(Do not use Standard Alphabet spacing with the Clearview font.)**

Based on a 100 mm capital letter height, each letter has a value for letter width, and a value for the side bearings on the leading edge and the trailing edge of each letterform *(Figure 11)*. The right side bearing is an average volume of space that, when abutted to the left side bearing of the next letter, will create fairly even letterspace for that word. With 100 mm capital letter height as a basis, words can be proportionally spaced for any letter height.

Replacing E-modified on an overhead guide sign with Clearview 5-W will require special attention because some words displayed in Clearview 5-W

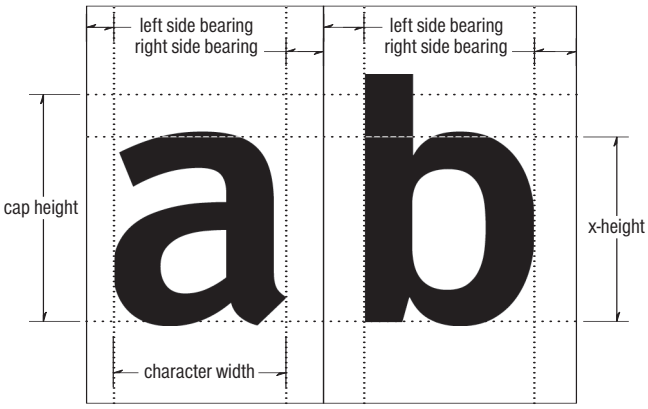


Figure 11.
Two letters with bounding box and dimensions

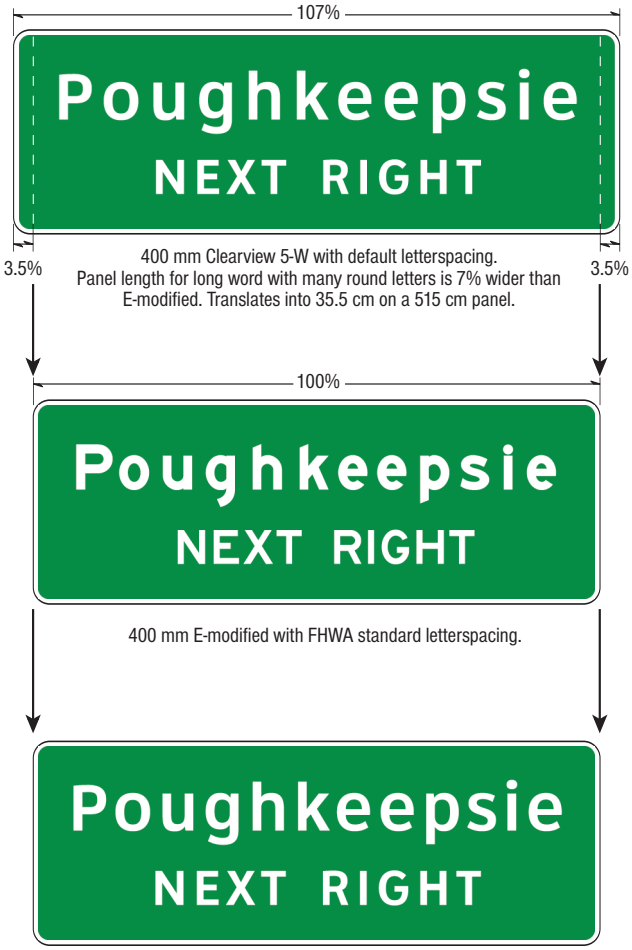
may be 5 to 7 percent longer than E-modified with the same capital letter height, depending on the specific letters in the word. If the overhead guide sign panel will not accommodate the longer word, and cannot be made wider because of lane width limitations, use Clearview 5-W-R. This version is identical to Clearview 5-W but has slightly less letterspacing to accommodate retrofit conditions *(Figures 12 and 18)*.

While this approach to letterspacing legends will simplify the layout process, it continues to have drawbacks because these side bearing dimensions are based on an average space and have been rounded to the nearest millimeter based on a 100 mm letter, for the 676 pairs of standard letterspacing for each typeface. Since millimeters are a very coarse measurement relative to digital font production, manual spacing tables will not apportion letterspace in as refined a manner as can be done electronically using the ClearviewHwy® font software *(Figure 13)*. This program contains the correct letterspacing (www.clearviewhwy.com), and can be scaled proportionally in any standard unit of measure including inches, millimeters, or points. In addition to the letterspacing built into each software version of the Clearview typeface, the program contains subtle kerning adjustments that enhance and improve letter fit based on thousands of letter combinations. Kerning is most noticeable with letter combinations in which the leading or trailing edge of one or both letters cre-

ates an unusual space such as “Te, ra, or Yo” that can not be averaged in all letter combinations.

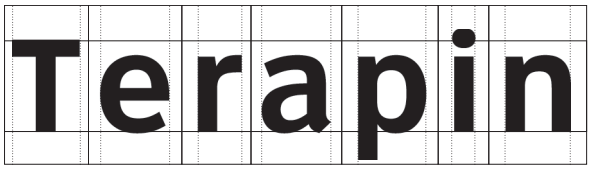
Not all applications support kerning data. Check with your applications manufacturer to learn if kerning is supported in your application. Lack of kerning does not detract from readability, but kerning does enhance the uniformity of the overall word. Using the ClearviewHwy® font software, the word length will vary slightly (+/-) as calculated from the published spacing tables, but the letters will appear more precisely spaced than manually calculated letter combinations.

Use of the software allows design engineers and fabricators to know the length of a legend when



400 mm Clearview 5-W-R with default letterspacing.
This version, with reduced letterspace is equal in length to E-modified

Figure 12.



13a. Word letterspaced with no kerning, based on letterspacing charts.

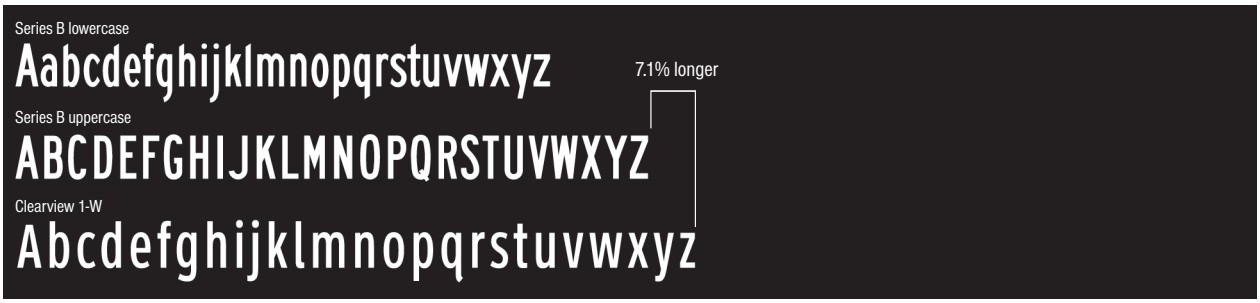
13b. Word letterspaced with no kerning

13c. Word letterspaced using ClearviewHwy® software with “auto” kerning active.
▲ When auto kerning is employed it visually accommodates letterspacing of atypical letter combinations.

Figure 13.
Letters spaced with manual chart (middle) vs. letters spaced with software using auto kerning (bottom)

creating a layout and allows legends to be pre-spaced when cut on a computer plotter. If letters are manually placed on signs, the most accurate and efficient guide is a full size paper outline plotting of the legend using the default letterspacing in the software. This plotted sheet, with baseline drawn, can then be used as a precise word layout template. Using a full size or scaled plot, the precise distance from trailing edge to leading edge can be measured and applied to the manual application of individual letters to the sign face.

Figure 14. FHWA Series B Compared to Clearview 1-W



This group compares the FHWA Series B in all uppercase to Clearview 1-W. With each typeface spaced to the FHWA (2002 Standard Highway Signs Book) and Clearview specifications (attached) respectively, the mixed case Clearview is approximately 7.1% longer based on the length of the full alphabet, and word length will vary compared to Series B uppercase.

FHWA Series B

Clearview 1-W

Figure 15. FHWA Series C Compared to Clearview 2-W

This group compares the FHWA Series C uppercase to Clearview 2-W. With each typeface spaced to the FHWA (2002 Standard Highway Signs Book) and Clearview specifications (attached) respectively, the mixed case Clearview is approximately 2.9% longer based on the length of the full alphabet, and word length will vary compared to Series C uppercase.

FHWA Series C

Clearview 2-W

Figure 16. FHWA Series D Compared to Clearview 3-W

This group compares the FHWA Series D uppercase to Clearview 3-W. With each typeface spaced to the FHWA (2002 Standard Highway Signs Book) and Clearview specifications (attached) respectively, the mixed case Clearview is approximately 1.8% shorter based on the length of the full alphabet, and word length will vary compared to Series D uppercase.

FHWA Series D

Clearview 3-W

Figure 17. FHWA Series E Compared to Clearview 4-W

Series E Uppercase

ABCDEFGHIJKLMNOPQRSTUVWXYZ

Series E lowercase

19.4% longer

Aabcdefghijklmnopqrstuvwxyz

Clearview 4-W

Aabcdefghijklmnopqrstuvwxyz

This group compares the FHWA Series E in all uppercase and in mixed case to Clearview 4-W. With each typeface spaced to the FHWA (2002 Standard Highway Signs Book) and Clearview specifications (attached) respectively, the mixed case Clearview is approximately 19.4% longer based on the length of the full alphabet, and word length will vary compared to Series E.

FHWA Series E

BERGAULTS

Clearview 4-W

Bergaults

Figure 18. FHWA Series E-modified Compared to Clearview 5-W

Series E -modified lowercase

4.7% longer

Aabcdefghijklmnopqrstuvwxyz

Clearview 5-W

Aabcdefghijklmnopqrstuvwxyz

Clearview 5-W-R

Aabcdefghijklmnopqrstuvwxyz

In a similar comparison of E-modified (FHWA standard spacing) to Clearview 5-W, the length of Clearview in this display of the entire lowercase alphabet is 4.7% greater. The proportional length of individual words will vary.

FHWA Series E-modifed

Bergaults

Clearview 5-W

Bergaults

Clearview 5-W-R developed from the need to use Clearview 5-W on signs placed directly over highway and expressway lanes. The letterspacing has been reduced to accomodate the limited width of these sign types.

Clearview 5-W-R

Bergaults

Figure 19. Clearview 5-W compared to Clearview 6-W

Clearview 5-W

Aabcdefghijklmnopqrstuvwxyz

Clearview 6-W

Aabcdefghijklmnopqrstuvwxyz

Clearview 6-W as proposed for freeway applications such as advance guide signs before bifurcated lanes, has 3.8% heavier stroke width than Clearview 5-W combined with 4.8% wider letterforms. Overall length of display is 8.6% greater than Clearview 5-W.

Clearview 5-W

Bergaults

Clearview 6-W

Bergaults

Criteria for Updating the Standard Alphabets

The specific criteria used to prepare the Clearview Type System for inclusion in this edition of the Standard Alphabets for Traffic Control Devices were to:

1. Create a replacement for E-modified that would provide increased legibility and ease of recognition with reduced halation for older drivers when used with high brightness sheeting materials.

2. Create mixed case alternatives to Series B, C, D, E, and F with greater legibility and ease of recognition at the same size as all uppercase Standard Highway Alphabet displays. This would be a typographic system based on mixed case applications.

3. Build on the basic Standard Alphabet hierarchy of six weights. Optimize letterform design for increased legibility and recognition for older drivers. Include versions of each weight for use in positive and negative contrast to address the problems of overglow on guide signs, and readability of negative contrast letters on regulatory and warning signs caused by bright sign panels.

4. Develop a method of manual spacing using both metric and English systems of measurement that is compatible with the method proposed for FHWA Standard Alphabets as specified in the 2000 Standard Highway Signs book.

5. Provide a proportionally scalable electronic version for uniform spacing for all type weights. This would use industry standard software, with spacing values and kerning that optimize legibility of the letterforms at the intended viewing distance. The software would be adaptable to a broad range of software applications commonly used in engineering departments and sign shops for standard highway sign design and production.

Request for Use as an Approved Alternative Typeface for Highway Signs

Use of the new Clearview Type System by the Federal Highway Administration was requested by the Pennsylvania Department of Transportation, which has used Clearview-Bold on an experimental basis for freeway signs. The Texas Department of Transportation has standardized on the use of Clearview following publication of their third research study (October 2003) using the final version of Clearview 3-W, Clearview 5-W and Clearview 5-W-R as shown in this supplement.

General Application Guidelines

Spacing of Clearview font shall follow the spacing tables for Clearview, and not SHS E-modified. This includes the use of the Clearview 5-W-R spacing tables for overhead conditions that may not accommodate a Clearview 5-W legend in replacement of existing E-modified legends. Action word messages and cardinal directions shall remain in all upper case letters and the first upper case letter of a cardinal direction shall be 10% greater in height for conventional road guide signs and per Table 2E.1 through Table 2E.4 for expressway/freeway guide signs. The Clearview font should not be used on negative contrast signs until research demonstrates its effectiveness.

Interim Approval for the use of Clearview font for positive contrast legend on guide signs will be granted to any jurisdiction that submits a written request to the Director of the Office of Transportation Operations. The request must state the location(s) where the device will be used and the jurisdiction's agreement to comply with item F at the bottom of page 1A-10 of the 2003 MUTCD, part of Section 1A.10. A state may request Interim Approval for all jurisdictions in that state.

The following sections provide general guidance on line space, letter and word space, and the relationship of legend to surrounding panel.

Line Space

Line space is controlled by a separate function in most software *(Figure 20)* and is generally measured from the baseline of one line to the baseline of the next line. With mixed case Clearview legends, it is important that the baseline to baseline space be at least 0.66x (two thirds the capital letter height between each line) to prevent a descending character from touching an ascending character on the line below. Actual line space measurements will follow sign layout grid formats with most interline space being 1x or more depending on application.

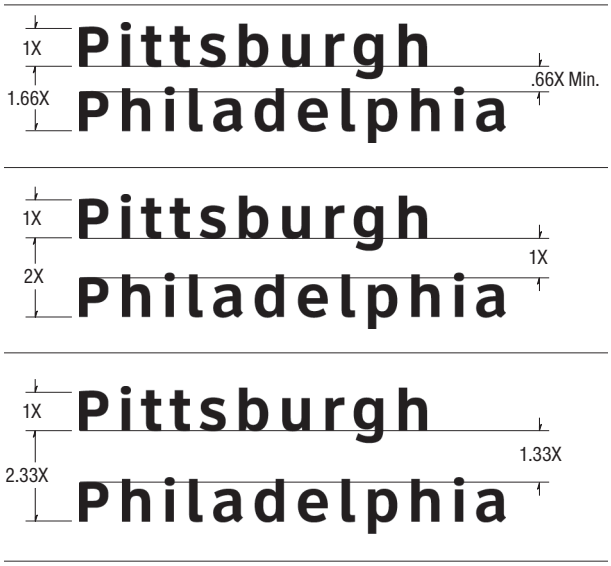


Figure 20.
Three examples, minimum line space, 1x and 1.33x showing both line space and baseline to baseline space

Regardless of whether the display uses mixed case or all capital letters, the space between characters and the space around the legend are critical. Letterspaced words that look very open at short distances will appear to have tighter letterspacing when viewed from the intended distance. In a similar way, if the legend is placed too close to the top or bottom borders of a sign, the ascenders and descenders will visually merge into the edge of the sign and create a word form that is more difficult to read when viewed from a long distance. Although a mixed case display will require a taller panel for a same size advance guide sign legend *(Figure 21)*, the ease of recognition will be improved significantly with the distinctive word pattern, increased letter space, and additional field around the word.

Figure 21.
FHWA Standard Alphabet Series C (top) vs. Clearview 2-W (bottom)

Guide Signs

The layout of conventional road guide signs (shown in section 3-30 to 3-33 in the 2000 Standard Highway Signs book with Series D alphabet), will require different alignment of legends to accommodate mixed case when using Clearview 3-W. This spacing is adjusted to accommodate the descenders and the balance of the legend along the top of the

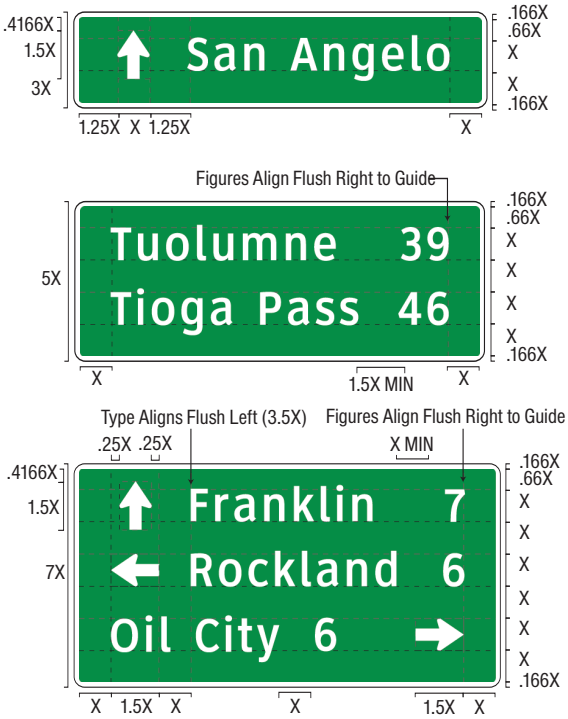


Figure 22.
Proportional grid for conventional road guide sign layout based on capital letter height of primary legend

panel *(Figure 22)*. The grids shown incorporate a proportional system based on the height of the initial capital letter. This proportional system accommodates both metric and English sizes and results in a consistent layout regardless of letter height.

Street Name Signs

When using mixed case letters on street name signs, the initial capital letter is not vertically centered on the panel as is common practice when all uppercase letters are used. The space between the baseline and the bottom of the sign panel is greater than the distance from the top of the panel to the top of the initial capital letter. This relationship should be consistent whether the legend contains descenders on not. These proportions are illustrated below *(Figures 23 and 24)*.

For typical street name signs, it is more effective to wrap the entire blade with sheeting to create a larger field for the legend. In compliance with section 2D.38 Street Name Sign (D3), the most appropriate layout uses a 150mm cap-height with a 2X (300mm) blank or a 100mm cap-height with an 200mm blank *(Figure 23)*. The minimum acceptable layout *(Figure 24)* uses a 150mm cap-height with a 250mm blank and a 100mm cap-height with a 170mm blank to appropriately accommodate the descender.

The examples below demonstrate Clearview 1-W and Clearview 2-W, with same size and alternate superscript road type designation. Street name signs using Clearview 1-W and Clearview 2-W with mixed cased legends will use more space vertically than all uppercase letters. However, the mixed case will improve both legibility and ease of recognition.

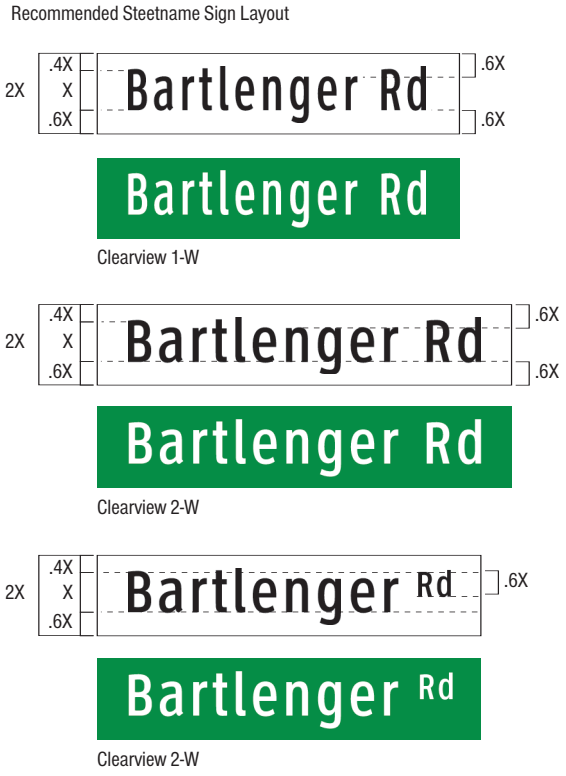


Figure 23.
Street name panel with sheeting placed edge to edge for maximum field.
12" blank uses 6" legend, 8" blank uses 4" legend

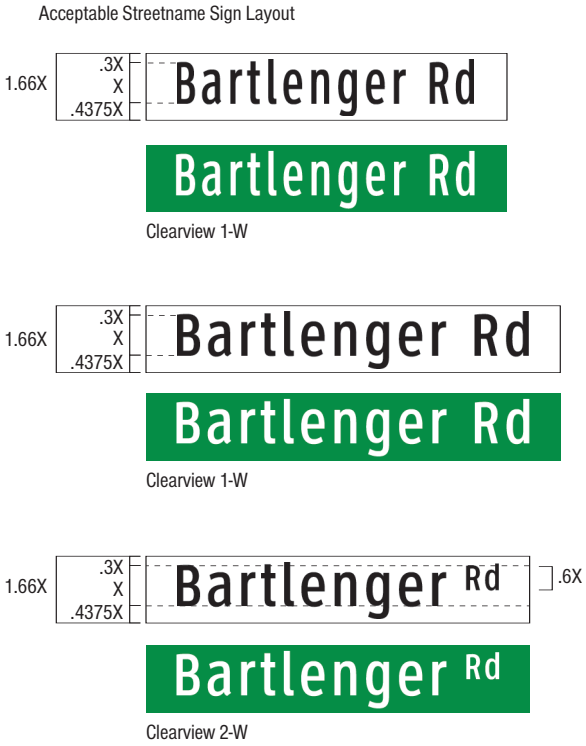


Figure 24.
Street name panel with sheeting placed edge to edge for maximum field.
10" blank uses 6" legend, 6.66" blank uses 4" legend

The Clearview Type System Alphabets

An accompanying letter-by-letter display of each typeface based on a 50 mm capital letter height with a 5 mm grid has been superimposed on the letters follows the spacing tables. Note that the positive contrast versions are shown as light on dark with reference (W), and the negative contrast versions are shown as dark on light with reference (B).

Letter Spacing Tables

The spacing tables on the following pages show the actual width of each character in millimeters along with the side bearing space to the left and to the right of each character. Dimensions for the this version are based on an uppercase letter height of 100 mm. Alternate sizes are proportionally scalable and can be obtained by simply enlarging or reducing spacing values provided in the tables for the initial capital letter of the desired letter height. All letters in this section are laid out on a grid background. All 12 versions of the Clearview typeface are shown at a size that is based on an uppercase letter height of 50 mm.

For general reference, based on 100 mm capital letter height, the lower case letter heights are 82 mm from the base line with the loop heights being 85 mm and the height of lower case ascending letters are 108.5 mm *(Figure 10)*.

Letter space for alternative sizes are proportional (scalable) and can be obtained by simply proportioning the upper case letter and letter space values to the desired dimensions from the following charts or using the ClearviewHwy® font software. All letters are laid out on a grid to illustrate both upper case and lower case letter height relationships, and relationship to the baseline.

The following chart identifies the page number for each letter spacing table and the respective typeface display.

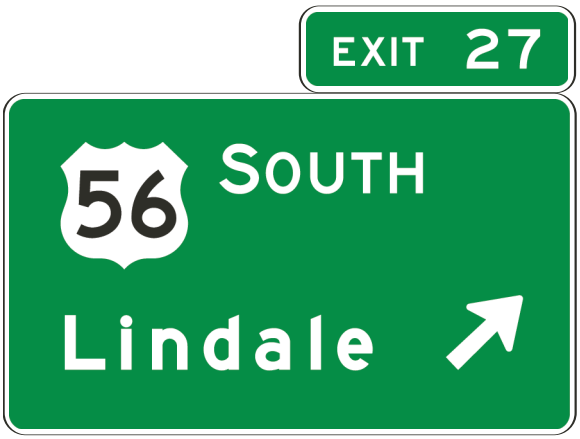
Typeface	Spacing Tables	Typeface Display
Clearview 1-B	Page 18	Page 31
Clearview 1-W	Page 19	Page 36
Clearview 2-B	Page 20	Page 41
Clearview 2-W	Page 21	Page 47
Clearview 3-B	Page 22	Page 53
Clearview 3-W	Page 23	Page 60
Clearview 4-B	Page 24	Page 67
Clearview 4-W	Page 25	Page 75
Clearview 5-B	Page 26	Page 83
Clearview 5-W	Page 27	Page 91
Clearview 5-W-R	Page 28	Page 91
Clearview 6-B	Page 29	Page 99
Clearview 6-W	Page 30	Page 108

Conceptual Applications

Up to this point, the Clearview development and research has been focused on guide signs and the typographic display of destination names in mixed case. Because Clearview mixed case has been shown to be more effective than all uppercase FHWA Standard Alphabet legends, it is proposed that use of Clearview also be explored for regulatory, warning, work zone, and motorist services signing. With many regulatory signs having similar appearance, but different content, the variation in word pattern obtainable with mixed case may aid overall legibility and understanding. This may not be a one-for-one font exchange; some type sizes and/or weights would likely be enlarged or reduced based on application.

It would be ideal if the multitude of sign sizes currently used could be reduced to a finite series of panel sizes for commonly used regulatory signs. This process would reduce cost, provide more modularity to the system, and improve the visual ordering of sign assemblies that include multiple panels. This process will require a comprehensive analysis of reading and reaction time needed for each type of sign as well as a careful determination of optimal panel sizes for urban applications where use of the smallest possible sign is critical.

With the development of a comprehensive family of weights for both positive and negative contrast within the Clearview Type System, it is quite possible that improvements in legibility and ease of understanding could be realized for regulatory, warning, work zone, and motorist services signing. To illustrate the options, a small, but representative sample of signs are shown below in both the current format as specified in the 2000 Standard Highway Signs book, and with Clearview type in a selective use of mixed case. These are shown as a concept, and are not intended for application.



Highway Guide Sign
Typeface: Destination Legend: FHWA Standard Alphabet, Series E-modified
Cardinal Direction Word Typeface: FHWA Standard Alphabet, Series E

Highway Guide Sign
Typeface: Destination Legend: Clearview 5-W replaces FHWA Standard Alphabet, Series E-modified. Cardinal Direction Word: Clearview 4-W replaces FHWA Standard Alphabet, Series E

Trailblazer Assembly
Typeface: "Cardinal Direction" FHWA Standard Alphabet, Series C
Assembly based on individual panels attached to structure members

Trailblazer Assembly
Typeface: Clearview 4-W replaces FHWA Standard Alphabet, Series C
Modular panels affixed to standard backing panel to create consistently sized field and common structural backing

Work Zone Sign
Typeface: FHWA Standard Alphabet, Series C

Work Zone Sign
Typeface: Clearview 3-B replaces FHWA Standard Alphabet, Series C for “Road Work”and numeral “5”, Clearview 2-B replaces “NEXT” and “MILES”

Warning Sign
Typeface: FHWA Standard Alphabet, Series C “LANE ENDS”
FHWA Standard Alphabet, Series D “MERGE RIGHT”

Warning Sign
Typeface: Clearview 2B replaces FHWA Standard Alphabet, Series C “LANE ENDS”, Clearview 3-B replaces FHWA Standard Alphabet, Series D “MERGE RIGHT”

Motorist Services Sign
Typeface: FHWA Standard Alphabet, Series D

Motorist Services Sign
Typeface: Clearview 4-W replaces FHWA Standard Alphabet, Series D for all. “MILES” has been reduced to create chunking of information

Regulatory Sign
Typeface: FHWA Standard Alphabet, Series D

Regulatory Sign
Typeface: Clearview 3-B replaces FHWA Standard Alphabet, Series D

Regulatory Sign
Typeface: FHWA Standard Alphabet, Series D

Regulatory Sign
Typeface: Clearview 3-B replaces FHWA Standard Alphabet, Series D

Standard Alphabets Spacing Chart

Measurements based on 100 millimeter upper case letter height

Clearview 1-B

For negative contrast applications
(dark type on light background)

Character	Left (mm)	Width (mm)	Right (mm)
A	5	58	5
B	13	48	9
C	9	50	5
D	13	50	9
E	13	38	7
F	13	36	6
G	9	53	9
H	13	48	13
I	13	14	13
J	6	34	13
K	13	50	4
L	13	35	6
M	13	57	13
N	13	52	13
O	9	59	9
P	13	46	7
Q	9	59	9
R	13	47	8
S	6	46	7
T	4	44	4
U	13	49	13
V	5	55	5
W	7	81	7
X	4	54	4
Y	4	53	4
Z	6	42	6
a	9	49	9
b	12	47	9
c	9	43	4
d	9	47	12
e	9	48	9
f	6	32	5
g	9	47	12
h	12	45	12
i	11	17	11
j	0	28	11
k	12	44	5
l	12	21	6
m	12	74	12
n	12	45	12

Character	Left (mm)	Width (mm)	Right (mm)
o	9	49	9
p	12	47	9
q	9	51	8
r	12	30	6
s	6	42	6
t	4	32	6
u	12	45	12
v	5	49	5
w	6	78	6
x	4	49	4
y	5	49	5
z	7	36	7
1	4	30	13
2	5	43	7
3	4	43	8
4	6	50	6
5	6	42	8
6	9	47	8
7	5	43	5
8	9	49	9
9	8	47	9
0	9	52	9
&	10	55	5
!	12	17	12
"	9	37	9
#	9	57	9
$	8	43	8
¢	9	41	6
/	5	44	5
*	9	37	9
.	9	16	9
,	9	17	8
:	9	16	9
(	8	19	10
)	10	19	8
-	12	28	12
@	10	68	10
=	11	38	11
+	9	48	9
?	9	39	9

Standard Alphabets Spacing Chart

Measurements based on 100 millimeter upper case letter height

Clearview 1-W

For positive contrast applications
(light type on dark background)

Character	Left (mm)	Width (mm)	Right (mm)
A	7	57	7
B	13	47	9
C	10	49	6
D	13	49	10
E	13	36	9
F	13	35	8
G	10	52	10
H	13	47	13
I	13	13	13
J	6	32	13
K	13	48	6
L	13	34	8
M	13	56	13
N	13	51	13
O	10	58	10
P	13	45	8
Q	10	58	10
R	13	46	10
S	7	45	9
T	5	42	5
U	13	48	13
V	7	53	7
W	8	80	8
X	5	52	5
Y	5	52	5
Z	7	43	7
a	9	47	10
b	13	46	10
c	10	42	7
d	10	46	13
e	10	46	10
f	7	31	6
g	10	46	13
h	13	44	13
i	11	16	11
j	0	27	11
k	13	43	7
l	13	20	8
m	13	73	13
n	13	44	13

Character	Left (mm)	Width (mm)	Right (mm)
o	10	48	10
p	13	46	10
q	10	50	9
r	13	29	7
s	7	41	8
t	6	31	8
u	13	44	13
v	7	47	7
w	8	77	8
x	6	47	6
y	7	47	7
z	8	35	8
1	4	29	13
2	5	42	8
3	5	42	10
4	7	49	8
5	7	41	9
6	10	46	9
7	6	42	6
8	10	48	10
9	9	46	10
0	10	51	10
&	12	54	7
!	11	16	11
"	10	36	10
#	10	56	10
$	9	42	9
¢	10	40	7
/	6	43	6
*	8	36	8
.	9	14	9
,	9	17	9
:	9	17	9
(	8	25	12
)	12	67	8
-	12	37	12
@	13	67	13
=	8	37	8
+	8	47	8
?	10	38	10

Standard Alphabets Spacing Chart

Measurements based on 100 millimeter upper case letter height

Clearview 2-B

For negative contrast applications
(dark type on light background)

Character	Left (mm)	Width (mm)	Right (mm)
A	5	72	5
B	14	60	9
C	11	63	6
D	14	62	11
E	14	46	8
F	14	44	7
G	11	66	11
H	14	60	14
I	14	17	14
J	5	41	14
K	14	62	4
L	14	43	7
M	14	72	14
N	14	65	14
O	11	73	11
P	14	57	8
Q	11	73	11
R	14	58	9
S	6	57	8
T	5	54	5
U	14	61	14
V	5	68	5
W	7	101	7
X	3	67	3
Y	3	66	3
Z	7	51	7
a	10	60	10
b	13	58	10
c	10	53	6
d	10	58	13
e	10	60	10
f	7	37	6
g	10	59	13
h	13	56	13
i	11	20	11
j	-3	34	11
k	13	55	4
l	13	26	7
m	13	93	13
n	13	56	13

Character	Left (mm)	Width (mm)	Right (mm)
o	10	63	10
p	13	58	10
q	10	64	8
r	13	36	7
s	7	53	8
t	5	37	7
u	13	55	13
v	5	60	5
w	6	97	6
x	3	61	3
y	5	60	5
z	7	45	7
1	5	36	14
2	7	53	10
3	6	53	10
4	7	63	8
5	9	52	10
6	11	58	9
7	7	53	7
8	11	60	11
9	9	59	10
0	11	65	11
&	10	68	6
!	14	20	14
"	9	47	9
#	10	71	10
$	9	53	9
¢	10	51	8
/	6	52	6
*	9	45	9
.	10	19	10
,	9	20	10
:	10	19	10
(	9	23	11
)	11	23	9
-	13	28	13
@	11	84	11
=	8	60	8
+	8	60	8
?	9	48	11

Standard Alphabets Spacing Chart

Measurements based on 100 millimeter upper case letter height

Clearview 2-W

For positive contrast applications
(light type on dark background)

Character	Left (mm)	Width (mm)	Right (mm)
A	7	69	7
B	14	57	10
C	11	61	7
D	14	60	11
E	14	45	11
F	14	43	10
G	11	64	11
H	14	58	14
I	14	15	14
J	6	40	14
K	14	59	6
L	14	41	7
M	14	70	14
N	14	63	14
O	11	71	11
P	14	55	9
Q	11	71	11
R	14	56	11
S	6	55	8
T	7	52	7
U	14	59	14
V	7	65	7
W	9	100	9
X	6	65	6
Y	5	64	5
Z	8	50	8
a	10	58	11
b	14	56	11
c	11	51	5
d	11	56	14
e	11	58	11
f	7	36	7
g	11	57	14
h	14	54	14
i	12	19	12
j	-1	33	12
k	14	53	6
l	14	24	8
m	14	91	14
n	14	54	14

Character	Left (mm)	Width (mm)	Right (mm)
o	11	60	11
p	14	56	11
q	11	62	9
r	14	35	7
s	7	49	8
t	7	36	8
u	14	54	14
v	6	58	6
w	8	95	8
x	4	58	4
y	6	58	6
z	7	43	7
1	6	34	15
2	8	52	12
3	7	51	11
4	7	61	9
5	9	51	11
6	11	57	10
7	8	51	9
8	11	59	11
9	10	57	11
0	12	63	12
&	11	66	6
!	14	19	14
"	12	43	12
#	12	68	12
$	11	51	11
¢	11	49	8
/	7	52	7
*	11	44	11
.	12	17	12
,	12	19	11
:	12	17	12
(	10	21	13
)	13	21	10
-	13	27	13
@	11	85	11
=	10	57	10
+	10	57	10
?	9	47	10

Standard Alphabets Spacing Chart

Measurements based on 100 millimeter upper case letter height

Clearview 3-B

For negative contrast applications
(dark type on light background)

Character	Left (mm)	Width (mm)	Right (mm)
A	6	86	6
B	15	70	10
C	12	74	7
D	15	74	12
E	15	57	10
F	15	55	9
G	12	78	12
H	15	70	15
I	15	19	15
J	7	49	15
K	15	72	5
L	15	52	9
M	15	84	15
N	15	75	15
O	12	85	12
P	15	67	9
Q	12	85	12
R	15	69	10
S	8	66	10
T	6	65	6
U	15	71	15
V	6	78	6
W	8	120	8
X	5	79	5
Y	4	79	4
Z	9	64	9
a	11	69	9
b	14	67	11
c	11	62	7
d	11	67	14
e	11	68	11
f	7	44	6
g	11	67	14
h	14	64	14
i	12	22	12
j	-6	40	12
k	14	65	4
l	14	30	7
m	14	105	14
n	14	64	14

Character	Left (mm)	Width (mm)	Right (mm)
o	11	71	11
p	14	67	11
q	11	73	8
r	14	42	7
s	7	60	9
t	6	44	9
u	14	63	14
v	6	70	6
w	8	109	8
x	4	71	4
y	6	71	6
z	9	55	9
1	4	42	14
2	8	62	10
3	6	63	10
4	8	72	8
5	9	62	10
6	11	67	10
7	6	64	7
8	11	69	11
9	10	67	11
0	11	75	11
&	11	79	5
!	15	23	15
"	10	52	10
#	10	81	10
$	8	62	8
¢	11	58	7
/	6	64	6
*	8	47	8
.	10	22	10
,	9	24	8
:	10	22	10
(	12	26	13
)	13	26	12
-	14	35	14
@	13	94	13
=	15	56	15
+	10	65	10
?	9	57	12

Standard Alphabets Spacing Chart

Measurements based on 100 millimeter upper case letter height

Clearview 3-W

For positive contrast applications
(light type on dark background)

Character	Left (mm)	Width (mm)	Right (mm)
A	6	83	6
B	15	68	9
C	11	72	6
D	15	71	11
E	15	55	9
F	15	53	8
G	11	76	11
H	15	68	15
I	15	17	15
J	6	47	15
K	15	68	5
L	15	51	7
M	15	82	15
N	15	73	15
O	11	83	11
P	15	65	11
Q	11	83	11
R	15	66	10
S	8	64	9
T	6	63	6
U	15	69	15
V	7	76	7
W	9	117	9
X	6	76	6
Y	5	76	5
Z	9	62	9
a	11	67	11
b	15	65	11
c	11	60	7
d	11	65	15
e	11	66	11
f	9	42	8
g	11	66	15
h	15	62	15
i	13	21	13
j	-4	38	13
k	15	62	6
l	15	28	8
m	15	103	15
n	15	62	15

Character	Left (mm)	Width (mm)	Right (mm)
o	11	70	11
p	15	65	11
q	11	71	9
r	15	41	8
s	8	58	9
t	6	43	10
u	15	61	15
v	6	68	6
w	8	106	8
x	6	68	6
y	6	69	6
z	9	53	9
1	5	40	15
2	7	61	11
3	6	61	11
4	7	71	8
5	9	61	11
6	12	65	10
7	7	62	8
8	11	67	11
9	10	66	12
0	11	73	11
&	11	77	6
!	15	22	15
"	12	48	12
#	11	78	11
$	10	60	10
¢	11	58	9
/	6	63	6
*	10	45	10
.	13	15	13
,	10	23	10
:	10	21	10
(	11	24	12
)	12	24	11
-	14	34	14
@	11	93	11
=	10	54	10
+	10	62	10
?	9	56	12

Standard Alphabets Spacing Chart

Measurements based on 100 millimeter upper case letter height

Clearview 4-B

For negative contrast applications
(dark type on light background)

Character	Left (mm)	Width (mm)	Right (mm)
A	8	91	8
B	18	74	12
C	14	77	8
D	18	78	13
E	18	61	12
F	18	58	11
G	13	83	13
H	18	74	18
I	18	20	18
J	8	52	18
K	18	76	7
L	18	56	11
M	18	89	18
N	18	80	18
O	13	89	13
P	18	70	12
Q	14	88	14
R	18	72	12
S	9	70	10
T	8	69	8
U	18	75	18
V	8	82	8
W	9	126	9
X	7	84	7
Y	5	84	5
Z	11	68	11
a	13	72	12
b	17	70	13
c	13	66	8
d	13	70	17
e	13	72	13
f	9	47	8
g	13	71	17
h	17	67	17
i	15	24	15
j	-4	43	15
k	17	69	7
l	17	32	9
m	17	110	17
n	17	67	17

Character	Left (mm)	Width (mm)	Right (mm)
o	13	75	13
p	17	70	13
q	13	77	10
r	17	45	9
s	8	63	10
t	8	47	11
u	17	66	17
v	7	74	7
w	9	113	9
x	6	75	6
y	7	76	7
z	9	58	9
1	7	44	17
2	10	66	13
3	9	67	13
4	9	76	11
5	12	66	13
6	14	70	13
7	9	67	9
8	14	71	14
9	13	71	14
0	14	79	14
&	13	83	7
!	17	25	17
"	14	55	14
#	14	84	14
$	10	66	10
¢	13	63	9
/	9	68	9
*	12	49	12
.	12	24	12
,	12	26	11
:	12	24	12
(	12	27	14
)	14	27	12
-	17	36	17
@	13	97	13
=	17	59	17
+	13	67	13
?	10	61	13

Standard Alphabets Spacing Chart

Measurements based on 100 millimeter upper case letter height

Clearview 4-W

For positive contrast applications
(light type on dark background)

Character	Left (mm)	Width (mm)	Right (mm)
A	7	87	7
B	18	71	12
C	14	76	9
D	18	75	14
E	18	59	13
F	18	56	13
G	14	80	14
H	18	72	18
I	18	18	18
J	8	49	18
K	18	73	7
L	18	54	9
M	18	86	18
N	18	77	18
O	14	87	14
P	18	68	13
Q	14	87	14
R	18	70	13
S	11	67	13
T	9	67	9
U	18	73	18
V	8	79	8
W	12	123	12
X	8	80	8
Y	7	81	7
Z	10	66	10
a	14	70	13
b	18	68	14
c	14	63	9
d	14	68	18
e	14	69	14
f	9	44	8
g	14	68	18
h	18	65	18
i	16	22	16
j	-3	41	16
k	18	66	7
l	18	30	10
m	18	107	18
n	18	65	18

Character	Left (mm)	Width (mm)	Right (mm)
o	14	73	14
p	18	68	14
q	14	75	12
r	18	43	9
s	11	60	12
t	9	46	12
u	18	64	18
v	8	71	8
w	10	110	10
x	7	72	7
y	8	72	8
z	10	57	10
1	7	42	18
2	9	64	13
3	8	65	13
4	8	74	9
5	11	64	13
6	13	68	12
7	9	65	9
8	14	70	14
9	12	68	13
0	14	77	14
&	13	80	8
!	16	23	16
"	14	51	14
#	13	81	13
$	11	63	11
¢	14	61	10
/	9	67	9
*	12	47	12
.	13	22	13
,	12	25	11
:	13	22	13
(	12	26	14
)	14	26	12
-	17	35	17
@	14	95	14
=	15	57	15
+	11	64	11
?	10	59	14

Standard Alphabets Spacing Chart

Measurements based on 100 millimeter upper case letter height

Clearview 5-B

For negative contrast applications
(dark type on light background)

Character	Left (mm)	Width (mm)	Right (mm)
A	8	97	8
B	18	78	13
C	14	84	9
D	18	83	14
E	18	66	13
F	18	63	11
G	14	89	14
H	18	79	18
I	18	22	18
J	9	56	18
K	18	82	8
L	18	61	12
M	18	94	18
N	18	85	18
O	14	95	14
P	18	75	12
Q	14	96	13
R	18	78	12
S	11	75	13
T	9	74	9
U	18	80	18
V	9	88	9
W	10	137	10
X	6	90	6
Y	5	92	5
Z	12	74	12
a	12	76	12
b	18	75	14
c	14	69	9
d	14	75	18
e	14	76	14
f	9	50	8
g	14	75	18
h	18	72	18
i	15	26	15
j	-4	46	15
k	18	74	8
l	18	34	11
m	18	116	18
n	18	72	18

Character	Left (mm)	Width (mm)	Right (mm)
o	14	80	14
p	18	75	14
q	14	82	11
r	18	48	10
s	10	66	12
t	7	51	11
u	18	70	18
v	8	79	8
w	10	119	10
x	7	81	7
y	8	81	8
z	11	63	11
1	8	48	18
2	10	71	14
3	9	72	14
4	10	81	10
5	12	71	14
6	15	74	14
7	9	73	9
8	15	75	15
9	14	75	15
0	15	83	15
&	14	88	7
!	16	27	16
"	14	58	14
#	14	88	14
$	12	70	12
¢	14	67	9
/	10	74	10
*	12	51	12
.	14	27	14
,	10	30	15
:	14	27	14
(	15	29	17
)	17	29	15
-	15	41	15
@	14	102	14
=	17	62	17
+	13	70	13
?	10	65	14

Standard Alphabets Spacing Chart

Measurements based on 100 millimeter upper case letter height

Clearview 5-W

For positive contrast applications
(light type on dark background)

Character	Left (mm)	Width (mm)	Right (mm)
A	9	94	9
B	20	76	15
C	16	82	11
D	20	81	16
E	20	64	14
F	20	61	13
G	16	87	16
H	20	77	20
I	20	20	20
J	8	56	20
K	20	78	9
L	20	59	12
M	20	92	20
N	20	83	20
O	16	93	16
P	20	73	12
Q	16	93	16
R	20	75	15
S	12	72	13
T	10	72	10
U	20	78	20
V	9	85	9
W	10	133	10
X	8	86	8
Y	7	88	7
Z	13	72	13
a	13	74	13
b	19	72	15
c	15	68	10
d	15	73	19
e	15	74	15
f	11	48	10
g	15	73	19
h	19	69	19
i	17	23	17
j	-3	44	17
k	19	71	7
l	19	32	11
m	19	113	19
n	19	69	19

Character	Left (mm)	Width (mm)	Right (mm)
o	15	77	15
p	19	73	15
q	15	80	12
r	19	46	10
s	11	64	13
t	9	49	11
u	19	68	19
v	7	76	7
w	8	116	8
x	6	77	6
y	7	78	7
z	12	61	12
1	10	45	20
2	12	69	16
3	11	70	16
4	12	79	13
5	15	69	16
6	16	73	15
7	10	71	10
8	16	73	16
9	15	73	16
0	17	82	17
&	16	86	10
!	18	25	18
"	14	54	14
#	14	86	14
$	12	68	12
¢	15	65	10
/	11	72	11
*	15	48	15
.	14	25	14
,	13	27	13
:	14	25	14
(	15	27	15
)	15	27	15
-	20	39	20
@	16	101	16
=	18	60	18
+	15	67	15
?	14	64	14

Standard Alphabets Spacing Chart

Measurements based on 100 millimeter upper case letter height

Clearview 5-W-R

For positive contrast applications
(light type on dark background)

Character	Left (mm)	Width (mm)	Right (mm)
A	6	94	6
B	17	76	12
C	13	82	8
D	17	81	13
E	17	64	11
F	17	61	10
G	13	87	13
H	20	77	20
I	17	20	17
J	5	56	17
K	17	78	6
L	17	59	9
M	17	92	17
N	17	83	17
O	13	93	13
P	17	73	9
Q	13	93	13
R	17	75	12
S	9	72	10
T	7	72	7
U	17	78	17
V	6	85	6
W	7	133	7
X	5	86	5
Y	4	88	4
Z	10	72	10
a	10	74	10
b	16	72	12
c	12	68	7
d	12	73	16
e	12	74	12
f	8	48	7
g	12	73	16
h	16	69	16
i	14	23	14
j	-6	44	14
k	16	71	4
l	16	32	8
m	16	113	16
n	16	69	16

Character	Left (mm)	Width (mm)	Right (mm)
o	12	77	12
p	16	73	12
q	12	80	9
r	16	46	7
s	7	64	10
t	6	49	9
u	16	68	16
v	4	76	4
w	5	116	5
x	3	77	3
y	4	78	4
z	9	61	9
1	7	45	17
2	9	69	13
3	8	70	13
4	9	79	10
5	12	69	13
6	13	73	12
7	7	71	7
8	13	73	13
9	12	73	13
0	14	82	14
&	13	86	7
!	15	25	15
"	11	54	11
#	11	86	11
$	9	68	9
¢	12	65	7
/	8	72	8
*	12	48	12
.	11	25	11
,	10	27	10
:	11	25	11
(	12	27	12
)	12	27	12
-	15	39	15
@	13	101	13
=	15	60	15
+	12	67	12
?	11	64	11

Standard Alphabets Spacing Chart

Measurements based on 100 millimeter upper case letter height

Clearview 6-B

For negative contrast applications
(dark type on light background)

Character	Left (mm)	Width (mm)	Right (mm)
A	9	120	9
B	21	119	16
C	17	118	13
D	21	125	17
E	21	106	15
F	21	102	14
G	17	127	17
H	21	125	21
I	21	64	21
J	11	90	21
K	21	116	10
L	21	100	14
M	21	140	21
N	21	131	21
O	17	133	17
P	21	114	15
Q	17	133	15
R	21	116	14
S	14	109	16
T	11	100	11
U	21	126	21
V	9	109	9
W	11	167	11
X	8	111	8
Y	7	111	7
Z	15	108	15
a	16	110	14
b	21	115	17
c	17	104	14
d	17	115	21
e	17	113	17
f	12	75	11
g	17	116	21
h	21	116	21
i	19	63	19
j	-4	63	19
k	21	107	9
l	21	69	13
m	21	162	21
n	21	116	21

Character	Left (mm)	Width (mm)	Right (mm)
o	17	116	17
p	21	115	17
q	17	116	14
r	21	84	13
s	13	96	15
t	12	82	16
u	21	115	21
v	10	103	10
w	12	147	12
x	8	100	8
y	10	105	10
z	14	94	14
1	8	78	21
2	13	104	16
3	12	105	17
4	13	110	13
5	15	107	17
6	17	110	16
7	10	97	10
8	17	112	17
9	16	111	17
0	17	121	17
&	17	119	11
!	20	68	20
"	17	93	17
#	17	124	17
$	16	105	16
¢	17	98	12
/	12	103	12
*	14	79	14
.	16	60	16
,	15	60	15
:	16	60	16
(	17	62	15
)	15	62	17
-	21	85	21
@	17	141	17
=	19	102	19
+	16	103	16
?	13	99	17

Standard Alphabets Spacing Chart

Measurements based on 100 millimeter upper case letter height

Clearview 6-W

For positive contrast applications
(light type on dark background)

Character	Left (mm)	Width (mm)	Right (mm)
A	11	121	11
B	22	117	15
C	18	118	14
D	22	125	18
E	22	105	15
F	22	101	14
G	18	127	18
H	22	125	22
I	22	64	22
J	13	91	22
K	22	115	11
L	22	100	15
M	22	140	22
N	22	131	22
O	18	134	18
P	22	114	16
Q	18	135	18
R	22	115	14
S	13	104	15
T	12	101	12
U	22	126	22
V	11	110	11
W	13	167	13
X	10	111	10
Y	8	109	8
Z	15	106	15
a	17	110	15
b	22	116	18
c	18	103	13
d	18	116	22
e	18	113	18
f	12	74	11
g	18	116	22
h	22	117	22
i	20	64	20
j	-2	65	20
k	22	106	9
l	22	68	13
m	22	163	22
n	22	117	22

Character	Left (mm)	Width (mm)	Right (mm)
o	18	117	18
p	22	116	18
q	18	116	15
r	22	82	12
s	13	95	15
t	12	81	17
u	22	115	22
v	11	102	11
w	13	146	13
x	10	101	10
y	11	104	11
z	14	93	14
1	12	81	22
2	14	103	16
3	14	105	17
4	14	112	15
5	17	107	17
6	18	111	17
7	10	95	10
8	17	110	17
9	17	111	18
0	18	121	18
&	18	118	10
!	20	66	20
"	17	90	17
#	17	122	17
$	15	102	15
¢	18	98	12
/	13	103	13
*	15	79	1
.	16	58	16
,	14	58	16
:	16	58	16
(	18	64	17
)	17	64	18
-	20	82	20
@	18	141	18
=	18	100	18
+	16	101	16
?	14	100	18

Clearview 1-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

ABCDE

FGHIJK

LMNOP

Clearview 1-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

QRSTU

VWXYZ

abcde

Clearview 1-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

fghijk

lmnop

qrstuv

Clearview 1-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

wxyz

123456

7890

Clearview 1-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

& ! " " # $ ¢

/ * , : ( ) -

@ = + ?

Clearview 1-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

ABCDE

FGHIJK

LMNOP

Clearview 1-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

QRSTU

VWXYZ

abcde

Clearview 1-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

fghijk

lmnop

qrstuv

Clearview 1-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

wxyz

123456

7890

Clearview 1-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

&!"#$¢

/*:,:()-

@=+?

Clearview 2-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

ABCD

EFGHI

JKLM

Clearview 2-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

NOPQ

RSTU

VWXY

Clearview 2-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

Zabc

defg

hijkl

Clearview 2-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

mnop

qrstu

vwxy

Clearview 2-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

Clearview 2-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

#$¢/*

.,:()-

@=+?

Clearview 2-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

ABCD

EFGHI

JKLM

Clearview 2-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

NOPQ

RSTU

VWXY

Clearview 2-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

Zabc

defg

hijkl

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

mnop

qrstu

vwxy

Clearview 2-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

Z1234

56789

0&!"#

Clearview 2-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

$¢/*•'

:()-@=

+?

Clearview 3-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

ABC

DEFG

HIJK

Clearview 3-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

LMN

OPQ

RSTU

Clearview 3-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

VWX

YZab

cdef

Clearview 3-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

g h i j k

l m n o

p q r s

Clearview 3-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

tuv

wxyz

1234

Clearview 3-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

5678

90&!

"#$¢

Clearview 3-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

/ * • , : ( )

- @ = +

?

Clearview 3-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

ABC

DEFG

HIJK

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

LMN

OPQ

RSTU

Clearview 3-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

VWX

YZab

cdef

Clearview 3-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

ghijk

lmno

pqrs

Clearview 3-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

tuv

wxyz

1234

Clearview 3-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

5678

90&!

"#$¢

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

/ * • , : ( )

- @ = +

?

Clearview 4-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

ABC

DEF

GHIJ

Clearview 4-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

KLM

NOP

QRS

Clearview 4-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

TUV

WXY

Zab

Clearview 4-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

cdef

ghij

klm

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

nop

qrst

uvw

Clearview 4-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

xyz

1234

567

Clearview 4-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

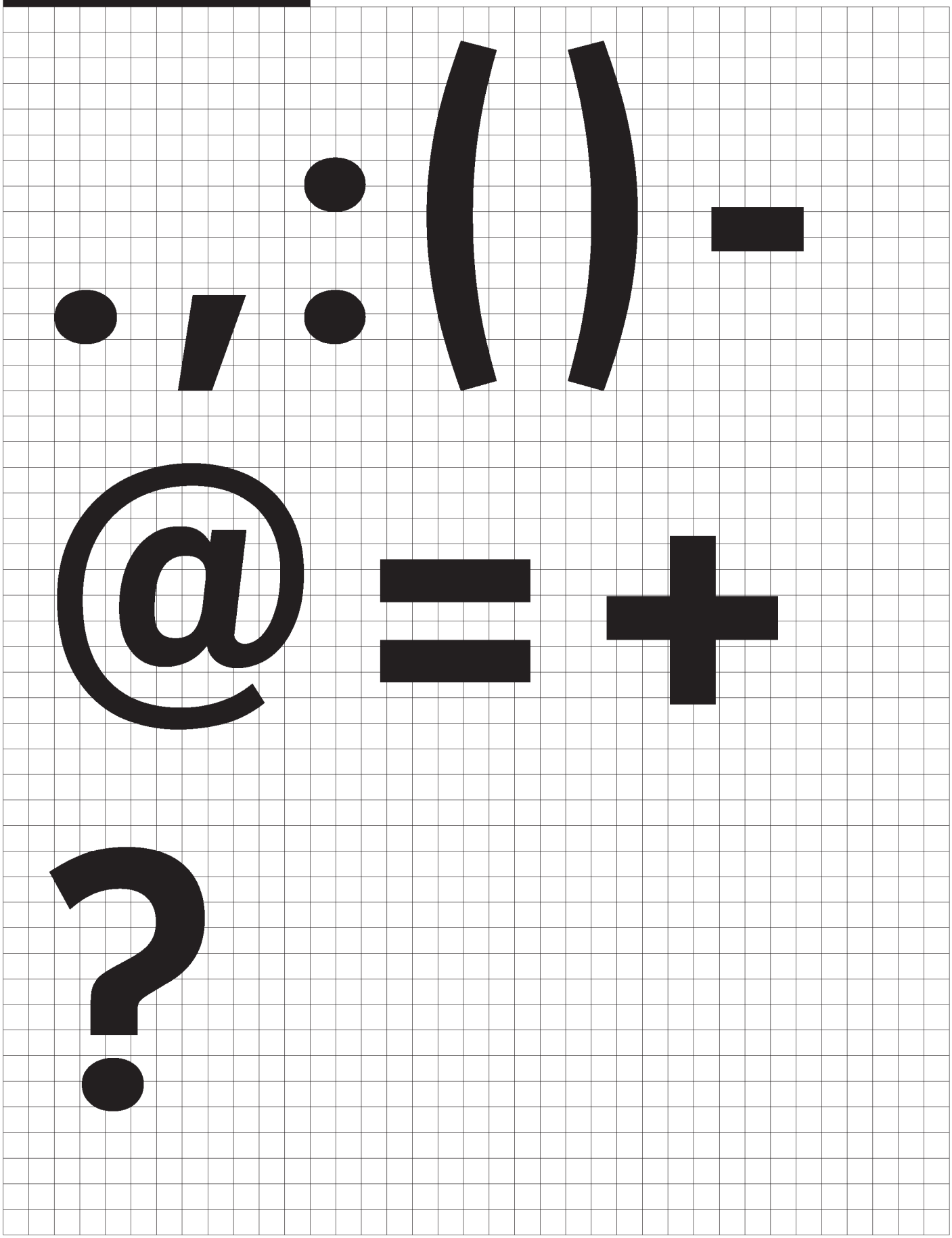
8 9 0

& ! ” ” #

$ ¢ / *

Clearview 4-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.



Clearview 4-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

ABC

DEF

GHIJ

Clearview 4-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

KLM

NOP

QRS

Clearview 4-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

TUV

WXY

Zab

Clearview 4-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

cdef

ghij

klm

Clearview 4-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

nop

qrst

uvw

Clearview 4-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

xyz

1234

5678

Clearview 4-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

90&!

"#$¢

/*.,:(

Clearview 4-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

)@=+

?

Clearview 5-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

ABC

DEF

GHIJ

Clearview 5-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

KLM

NOP

QRS

Clearview 5-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

TUV

WXY

Zab

Clearview 5-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

cdef

ghij

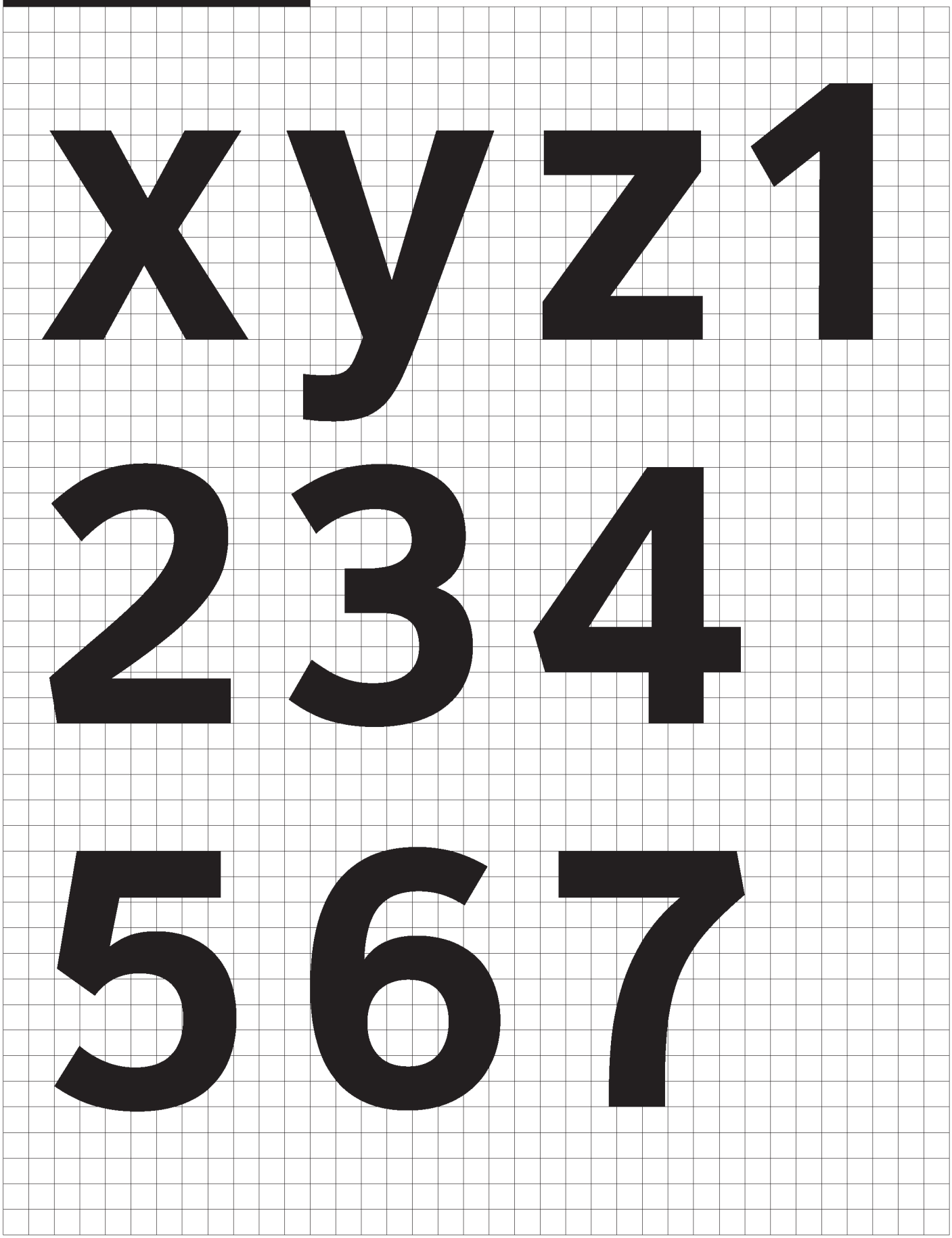
klm

Clearview 5-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

Clearview 5-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.



Clearview 5-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

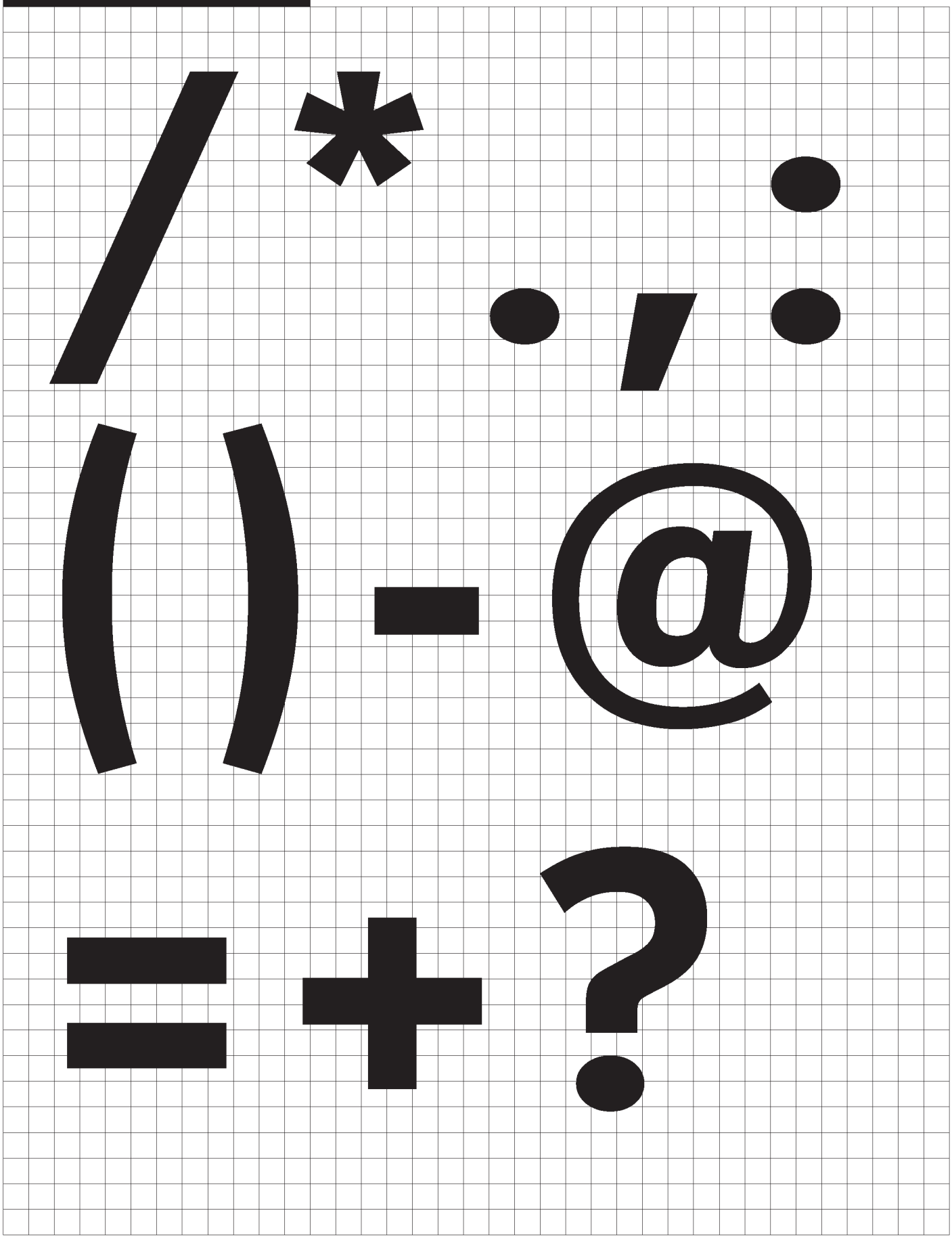
8 9 0

& ! ” ”

$ ¢

Clearview 5-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.



Clearview 5-W and 5-W-R

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

ABC

DEF

GHI

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

JKL

MNO

PQR

Clearview 5-W and 5-W-R

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

STU

VWX

YZa

Clearview 5-W and 5-W-R

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

b c d

e f g h

i j k l

Clearview 5-W and 5-W-R

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

mno

pqr

stuv

Clearview 5-W and 5-W-R

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

wxy

z123

456

Clearview 5-W and 5-W-R

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

789

0&!"

#$¢

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

/ * : ; ( ) - @ = + ?

Clearview 6-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

ABC

DEF

GHI

Clearview 6-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

JKL

MN

OP

Clearview 6-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

QRS

TUV

WX

Clearview 6-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

Y Z a

b c d

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Clearview 6-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

hijk

lmn

opq

Clearview 6-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

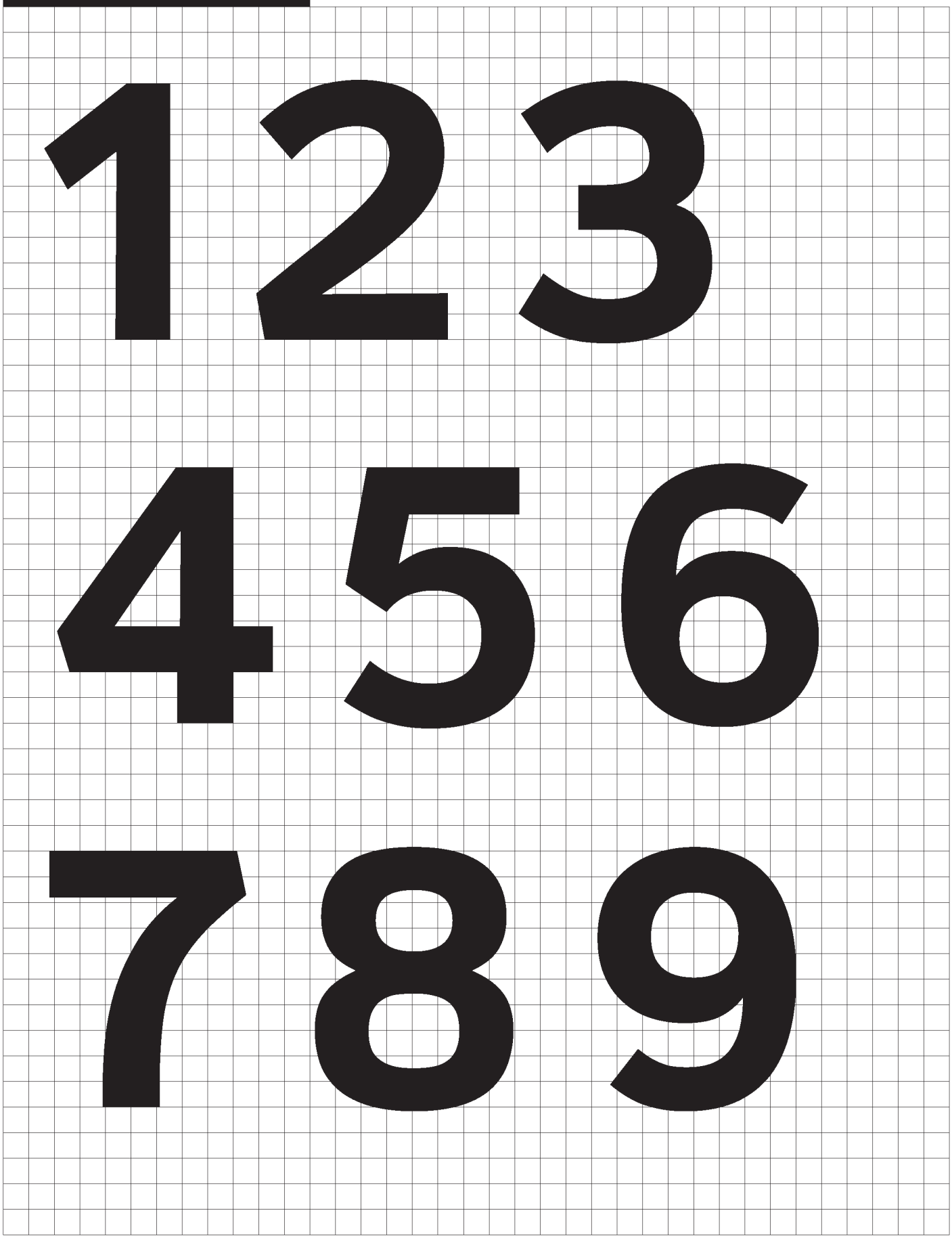
rst

uvw

xyz

Clearview 6-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.



Clearview 6-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

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Clearview 6-B

Display characters are based on a 50 millimeter upper case letter height for use in positive contrast applications.

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@ = +

?

Clearview 6-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

ABC

DEF

GHI

Clearview 6-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

JKL

MN

OP

Clearview 6-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

QRS

TUV

WX

Clearview 6-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

Y Z a

b c d

e f g

Clearview 6-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

hijk

lmn

opq

Clearview 6-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

rst

uvw

xyz

Clearview 6-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

123

456

789

Clearview 6-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.

0&!

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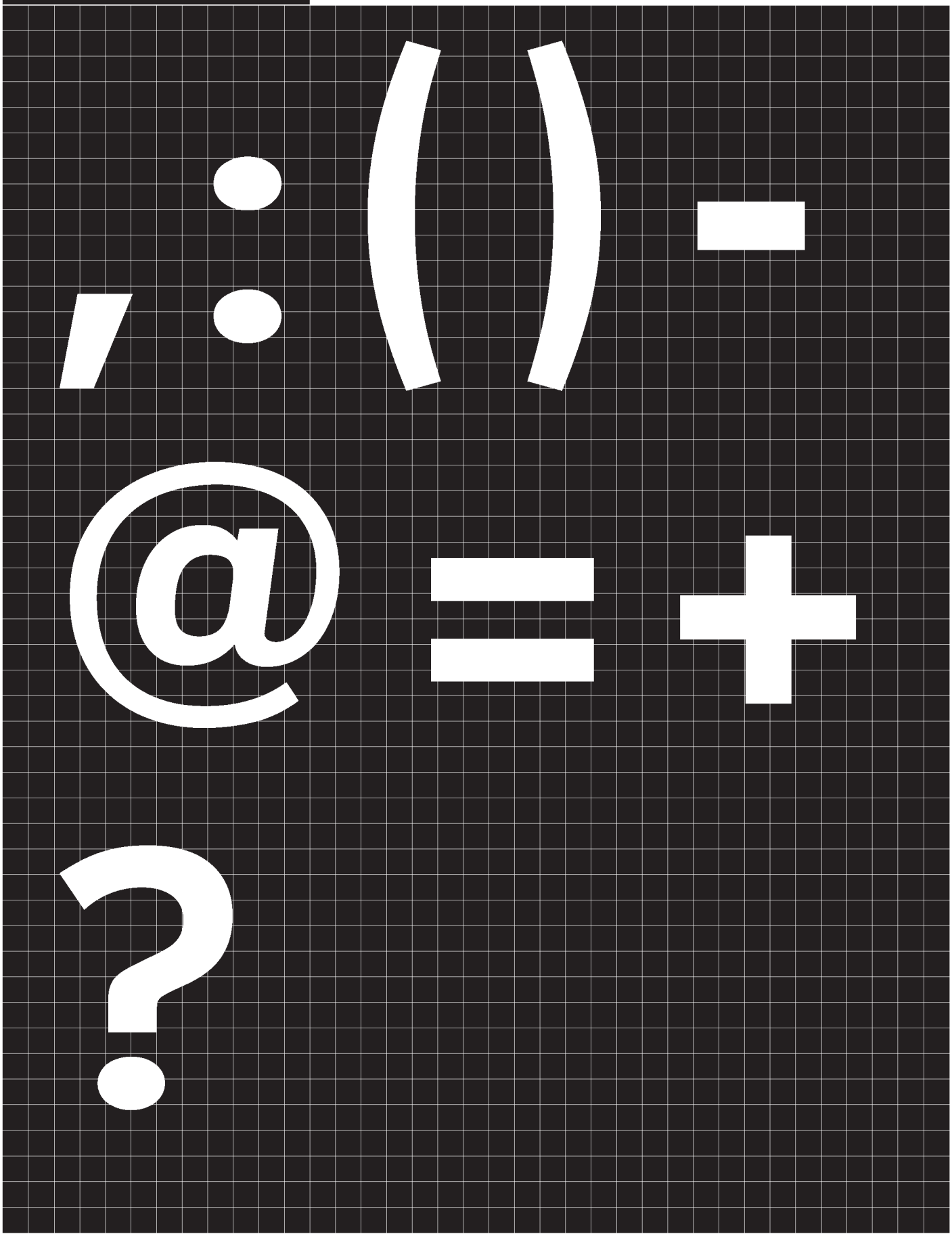
Clearview 6-W

Display characters are based on a 50 millimeter upper case letter height for use in negative contrast applications.