The first documented auto fatality in the United States was H.H. Bliss of New York City.

He was struck by an electric powered taxicab on September 13, 1899, while walking out of a trolley car.

Arthur Smith, the driver of the taxicab, was arrested and charged with manslaughter, but was acquitted on the grounds that he had no malice, nor was he negligent.
Shadow Contrast Pavement Marking

- 10’ white, 10’ black, and 20’ gap
Shadow Contrast Pavement Marking
Shadow Contrast Pavement Marking

- 10’ white, 10’ black, and 20’ gap
- Regular skip line is 10’ white and 30’ gap
- Improve visibility in various conditions:
  - Low light/dusk
  - White concrete “washing out” white skips
  - Nighttime? Inclement weather?
- Not a patented product, anyone can utilize it
- Don’t confuse it with Contrast Pavement Marking, different than Shadow Contrast Pavement Marking
Shadow Contrast Pavement Marking
Contrast vs. Shadow Contrast Marking
Vertical Lift Road Closure Gate
Vertical Lift Road Closure Gate
Vertical Lift Road Closure Gate

NOTES:
1) When mounting the 40' road closure gate on the light standard, the luminaire arm will be rotated slightly to allow the gate to be stowed in the upright position.

2) Provide and install light standards in accordance with Section 770 of the NDOT Standard Foundation details.

*See Standard D-770-1 for additional Light & Signal Standard Foundation details

**Supply fiberglass/aluminum gate arm and cast adapter from Safetran, or equivalent.

---

This document was originally issued and sealed by Douglas A. Brahmer, Registration Number PE-5047, on 07/16/15 and the original document is stored at the North Dakota Department of Transportation.
Vertical Lift Road Closure Gate

- IM–5–094(101)000 installed near Beach
- Installed on project by project basis future
Highway Gothic & Clearview Font

- “Highway Gothic” Series A, B, C, D, E, & F
- Also known as FHWA Series font, or “Standard Alphabets for Highway Signs”
- Developed by the Public Roads Administration (FHWA) during World War II
- Series E–modified developed in 1950 to allow button reflectors
- It is the standard
- Free for everyone to use

series Em (prior to clearview)
Highway Gothic & Clearview Font

Braysville

Troy  35
Utica  15
Albany  30

series Em (prior to clearview)
Highway Gothic & Clearview Font

- Clearview font developed by Donald Meeker with help of Texas and Penn. Trans. Institutes under supervision of FHWA in 1990’s
- Initial research indicates better legibility, particularly with older drivers
- Larger counter spaces (spaces inside lower case letters like “e” “a”) with goal to reduce “haloing” of letters at night
- Larger “x” height, relative lower to upper
Highway Gothic & Clearview Font

Mechanical Form
Counter Space
Stroke Massing
Terminating Stroke End

Bergaults

FHWA Series E Modified
Ambiguous Shape

Clearview 5-W
Highway Gothic & Clearview Font

- FHWA interim approval for use 2004 (IA-5)
- FHWA cited initial research:
  - 16% improvement in sign recognition in older drivers
  - Clearview enhanced legibility for drivers at 45mph by an extra 80 feet of reading distance

- NDDOT began using Clearview on highways signage in 2008
Highway Gothic & Clearview Font

series Em (prior to clearview)

clearview font 5W
Highway Gothic & Clearview Font

Braysville

Braysville

Braysville

series Em

Clearview 5W
Elimination of Clearview Font

- FHWA (IA–5) approval from 2004 was rescinded in January 2016. FHWA addressed reasons:
  - Clearview fonts were less legible as they aged
  - Worse legibility for negative contrast signs (white on black, and yellow warning signs)
  - Subsequent evals showed no benefit to the narrower letter forms degraded legibility
  - New signs with Clearview were compared to old and worn signs with Highway Gothic, looked better because they were new

- Clearview copyrighted to Meeker and Associates, and requires a one time fee per workstation
Elimination of Clearview Font

- Back to the drawing board
- Prior to 2008, all NDDOT signs had used Highway Gothic Series E modified.
- Start from scratch, goal is to follow MUTCD and SHSM as closely as possible:
  - Freeways (Interstate) use Series E and E modified
  - Expressways (US divided) and Conventional (2-lane) use Series D with increase to spacing.
Series D with increased spacing

series D normal

series D +175% spacing
Last 13 years....

Braysville

series Em

Braysville

Clearview 5W

Braysville

Series D +175% spacing
NDDOT Design Division has created new templates in GuideSIGN

Over 1600+ sign templates that covers every scenario

Many months of manhours by the NDDOT’s foremost expert in signing

Available for download in CADD Manual under section 2.12

USE THEM!
Latest Sign Standard Updates

- **D–754–9 (Revised)**
  - Arrow details will be revised with the designations and sizes used by GuideSIGN
  - Arrow details for Roundabout Guide Signs will be added
  - Arrow details for Parking Signs and Frontage Road Signs will be added

- **D–754–10 (New)**
  - Arrow details for Advance Intersection Lane Control, Lane–Use Control, and Overhead Arrow–Per–Lane Signs

- **D–754–XX (New)**
  - Standard State Route Marker Details
NDDOT officially began designing all new lighting system installations as LED back in January, 2016.

New installations only, existing lighting systems remained as is

High Mast Lighting conversion to LED projects in 11/25/2016 & 12/2/2016

Project IM–NH–9–999(369) GF, Fargo, VC

Project IM–NH–9–999(369) Bismarck, Minot
High Mast LED Lighting

- Old high pressure sodium luminaire (yellow-light)
- ~1080 Watts
High Mast LED Lighting

- New LED luminaire (Holophane HMAO LED II)
- ~500 Watts
High Mast LED Lighting

- Just change a light bulb, easy right?
- Existing systems where installed at different times, with different spacings, and different # of luminaires
- Every system was revised/redesigned to meet current standards—AASHTO Roadway Lighting Guide 2005 ed.
- In all cases, the LED luminaires lit the roadway and ramps better than existing
- 3000K color temp on LED
- Design life high pressure sodium approx. 3 yrs
- Design life LED light approx. 22 yrs
High Mast LED Lighting

- 9th St & I-94 (West Fargo)
High Mast LED Lighting

- 9th St & I-94 (West Fargo)
High Mast LED Lighting

- 9th St & I-94 (West Fargo)
High Mast LED Lighting

- **9th St & I–94 (West Fargo)**

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<tr>
<th>Description</th>
<th>Symbol</th>
<th>Avg</th>
<th>Max</th>
<th>Min</th>
<th>Max/Min</th>
<th>Avg/Min</th>
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<td>2.2 fc</td>
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<td>2.3:1</td>
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<td>1.0 fc</td>
<td>2.2 fc</td>
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<td>2.1 fc</td>
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<td>2.1 fc</td>
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<td>1.7 fc</td>
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<td>2.5:1</td>
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<tr>
<td>SW ramp</td>
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<td>2.2 fc</td>
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<td>2.3:1</td>
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## High Mast LED Lighting

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<th>Sheyenne St West Fargo I-94</th>
<th>Proposed - 9th St West Fargo I-94 with 2-6 lum</th>
<th>Proposed 45th St Fargo I-94 with 3-8 lum</th>
<th>25 St Fargo I-94</th>
<th>Univ. Dr Fargo I-94</th>
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<td>Interstate</td>
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<td><strong>with 3-8 lum</strong></td>
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<td><strong>Univ. Dr Fargo I-94</strong></td>
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</tr>
</tbody>
</table>
High Mast LED Lighting

- Old mast pole being removed and replaced
High Mast LED Lighting

- Same pole as they are lowering it
High Mast LED Lighting

- New pole being installed
High Mast LED Lighting

- New pole being installed
High Mast LED Lighting

- View of new LED Luminaires
High Mast LED Lighting

- Lowering device
High Mast LED Lighting

- Some poles needed replacement
High Mast LED Lighting

- ....and some needed a good cleaning!
Rural Approaches

- D–203–8 revisions
- PPG Detail revisions
D–203–8 revisions
   ◦ Radius increased
   ◦ Storage platform increased
   ◦ No changes to width and max grade

Minor Rehab Sliver Grading projects will now address approach geometric (D–203–8)

Revised paving/gravel limits for approaches, details (Section 20 sheets) on PPG website
Storage Platform

40' Storage Platform with no stop sign
*AASHTO 2011 Green Book page 9-38, Vehicle stopped 10' from edge of major-road traveled roadway

50' Storage Platform with stop sign
*Stop Sign location from D-754-23, 21' from edge of driving lane for 50' Radius Intersection

This document is preliminary and not for construction or implementation purposes.
Rural Approach Detail

1. Actual HMA paving and aggregate base course locations may vary in the field, as approved by the Engineer.
2. Quantity totals have been included in the bid items of the “Estimate of Quantities” of the plans.
3. Aggregate base course has been provided in the quantities to fill in around the rail. This material will be required when slopes are steeper than 4:1 (see section C-C).

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<th>ITEM</th>
<th>UNIT</th>
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This document is preliminary and not for construction or implementation purposes.

Approach Paving Details for Existing Rural Approaches

(No Approach Grading)
Rural Approach Detail

Notes:
1. Actual HMA paving and aggregate base course locations may vary in the field, as approved by the Engineer.
2. Quantity totals have been included in the old items of the "Estimate of Quantities" of the plans.

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<td>Number of Locations</td>
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<td>?</td>
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</table>

Approach Paving Details for New or Regrading Rural Approaches
(Approach Grading)

This document is preliminary and not for construction or implementation purposes.
Thank you!

- Matt Gangness, PE
  - Design Division → ETS Division
  - NDDOT

That’s all Folks!