City of Dyersville
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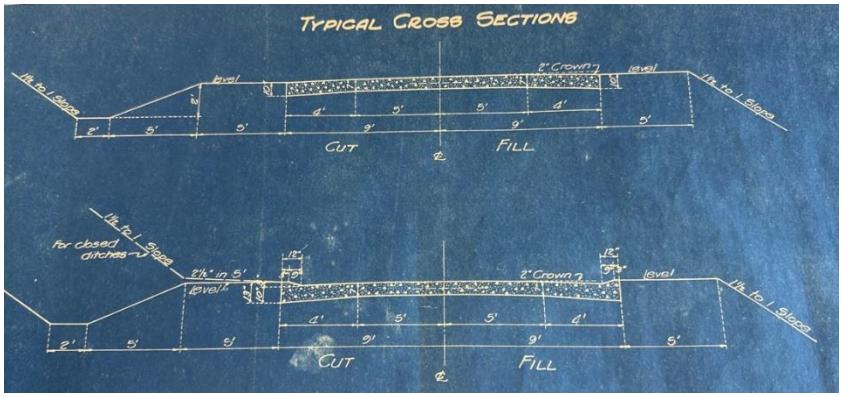
www.cityofdyersville.com

To: Mayor Jacque and City Council Members
Cc: Mick Michel, City Administrator
From: John F. Wandsnider, PE – Public Works Director/City Engineer
Date: May 16, 2024
Subject: Improvements to 1st Avenue W – West of Roundabout
Preliminary Design Study

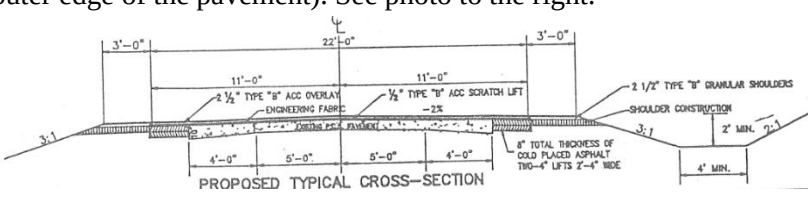
The purpose of this report is to present the findings of a Preliminary Design Study for the improvements to 1st Avenue West, from the city limits line (east of the viaduct) to the intersection with 330th Avenue (roundabout), approximately 1.4 miles. See the image, below.

History

This section of roadway was a part of US Route 20, as designated by the Federal Government in 1926. The next year, this section was paved with an 18-foot wide, 7"-to-10" variable thickness concrete pavement (see Typical Section, at right). Decades later, the concrete surface was overlain with 2-1/2" asphalt pavement. Prior to 1983, the US-20 route was moved to a newly constructed alignment 1 mile to the south, and this section of roadway transferred to Delaware County, becoming 210th Street.



In 1995, a project was constructed to widen the pavement from 18 feet to 22 feet by milling off the asphalt surface and using it to construct the widening. The widened section was then entirely overlain with 3" of asphalt pavement (see Typical Section, below). According to the Delaware County Engineer, four years later in 1999, the pavement had to be fortified with "a 24" wide slurry leveling on the outside two edges" (hence the difference in appearance of the outer edge of the pavement). See photo to the right.



In 2006 (Res. 28-06, 10/26/2006), the City of Dyersville annexed property along 210th Street, and this portion of the roadway transferred to the City, becoming 1st Avenue W.

Existing Conditions

With it being 29 years since the 1995 resurfacing (and 25 since the slurry-leveling), it is no surprise the pavement needs attention. Multiple cracking and potholes have developed along the joints and edges. Keeping them filled has become a regular and expensive maintenance task (see photos of some of the worst areas, below).



In spite of this, the foundation of the roadway appears to be in fairly good condition. The ride is rough in places, primarily due to the degradation of the surface course – not due to foundation failure (see photos, below). It appears that little, if any foundation work would need to be performed. A surface treatment of the appropriate application could easily bring this facility back to a serviceable condition.



Existing Traffic

The Average Annual Daily Traffic is estimated at 1080 vehicles per day according the Iowa DOT. The roadway is classified by the Iowa DOT as a Major Collector. With BARD opening up a sand-pit along the

south side on the east half of the roadway, this portion will see higher traffic and more heavy vehicles than previously.

Existing and Future Use

With the major east-west highway in US-20 carrying the lion's share of the through traffic just a mile to the south, this roadway sees primarily local and area traffic. The Dyersville Comprehensive Plan indicates that the land along this roadway is expected to become Light Industrial. It is unknown how or when this area will develop, but the possibility exists that changes could be made to the roadway alignment within the next 10 to 20 years. Therefore, a target useful life for the improvement of from 10 to 15 years is recommended.

Approaches to Improvement

The City Engineer has been working with both the Delaware and Dubuque County Engineers to identify options for improving the roadway. Both counties have experience with numerous projects of a similar nature. From concrete pavement overlays (known in the industry as 'whitetopping'), to asphalt pavement overlays, to various types of pavement preservation techniques, they have a good amount of experience to draw from and have been very helpful. They have also helped to provide the historic information and recent cost data to help in estimating the costs for improvements to 1st Avenue West.

1. **6-inch Whitetop:** The portion of Delaware County 210th Street immediately west of this pavement section was 'Whitetopped' with 6 inches of concrete pavement overlay in 2014. It appears to be holding up well, with only occasional minor cracking (and an annoying pitting of the surface that seems to have stabilized). Though the most costly approach to rehabilitation, Whitetopping can be expected to last the longest, approximately 35 years or more.
2. **4-inch HMA Overlay:** The most common approach to rehabilitation of highways in this condition in recent years has become the 4-inch Hot-Mixed Asphalt overlay with interlayer. The pavement section consists of a 1-1/2-inch "wedge, level, strength" course, a 1-inch "interlayer" course, and a 1-1/2-inch surface course. This approach is still quite costly and can be expected to last 25 years or more.
3. **2-inch HMA Overlay:** In talking with the county engineers, due to the same funding shortages Dyersville is facing, they will be looking more and more at ways to reduce costs. Overlays of 2 and 3 inch thickness appear to be in their futures as well. This uses a ½-inch "scratch leveling" course followed by a 1-1/2" surface course. A 2-inch overlay can be expected to last 15 years or more.
4. **Micro-Surfacing:** This uses a very thin asphalt emulsion material application. We have successfully applied this approach to alleys and a gravel parking lot in Dyersville. This would not eliminate smoothness (ride) issues with the existing pavement. It can be expected to last 5 years.
5. **½" Chip-Sealcoat:** Chip-sealing is a thin film of heated asphalt liquid sprayed on the road surface, followed by the placement of small aggregate ("chips"). The chips are then compacted to orient them for maximum adherence to the asphalt, and excess stone is removed from the surface. This is not utilized in more urban areas due to the fact that the small stones can become a nuisance until they are set in a stabilized. It can be expected to last 5 years.
6. **Do Nothing – Continue to Patch**: Since 2018, we have been able to track the costs spent on patching the pot-holes in the pavement. We spend $3,000 to $3,500 annually on this section of roadway. Although this would certainly be the least-expective approach, it is considered unacceptable due to the safety and nuisance of the reappearing potholes. And the pavement is only going to become worse moving forward.

Cost Comparisons

The following table provides a summary of the costs for the various approaches or options, and then provides an estimate of the 'cost-per-year' for comparison.

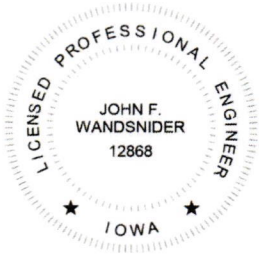
Improvement Type	Cost Est. for 1st Ave (1.4 mi)	Length of Service (yrs)	Estimated Cost/Year
1. 6-inch Whitetop	$765,951	35	$21,884
2. 4-inch HMA Overlay	$604,261	25	$24,170
3. 2-inch HMA Overlay	$287,500	15	$19,167
4. Micro-Surfacing	$92,000	5	$18,400
5. 1/2" Chip-Sealcoat	$80,500	5	$16,100
6. Do Nothing - Patch		1	$3,000 - 3,500

Budget and Planning

For FY-25, Public Works has a budget allocation for street and road rehabilitation of $150,000. This would likely not change much in the near future. Therefore, we would only be able to afford Options 4 or 5. With a 5-year useful life, we do not feel these to be desirable options - we do not wish to be back again every 5 years.

With the recommendation for a target useful life of 10 to 15 years, Option 3 seems the most suitable. This option also appears to provide the best value, of the three overlay options. However, the cost for Option 3 is well above the Public Work's annual allocation of $150,000. Therefore, in order to perform this improvement, the City would need to find the money elsewhere, through bonds or other means.

If the City were to divide the project up over, say, 3 years, we would be able to do it with operations funds. There wouldn't be much else that could be done in town, however. Constructing the project over 3 years would bring the per-year cost to $95,833, using simple math. This cost would likely grow some each year due to rising costs, additional mobilizations, and the need to place a pavement header at each end of the project (going from 2 to 6 headers). It is recommended that Public Works budget **$105,000** per year, if this option is chosen.



I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licenses Professional Engineer under the laws of the State of Iowa.

For the City of Dyersville, Iowa

5/16/24

John F. Wandsnider, P.E. Date

License Number 12868

My license renewal date is December 31, 2025

Pages or sheets covered by this seal:

Entire report

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