FAP Route 776 (IL Route 142)
Section 125R-1
Saline County
From Willow Creek mine entrance south (SB lane only)

We have reviewed the pavement selection for the above captioned section, which was submitted with your memorandum dated March 23, 2012. The approved pavement design is as follows:

**IL Route 142 SB only (Pavement Reconstruction)**

- 13 inches of HMA Pavement
- 2 inches of Polymerized HMA Surface Course, Mix "C", N105
- 2.25 inches of Polymerized HMA Binder Course, IL-19.0, N105
- 8.75 inches of HMA Binder Course, IL-19.0, N90
- 18 inches of Lime Stabilization

If you have any questions, please contact Paul Niedernhofer at (217) 524-1651.
### IDOT DISTRICT 9

**QUANTITY COMPUTATIONS**

**JOB DESCRIPTION:** Prop. Special project on IL 142 from Mine Haul Rd. to 0.4 mile South of Mine Haul Rd. at Sta. 216+08 to Sta. 238+45

<table>
<thead>
<tr>
<th>Year</th>
<th>ADT 2010</th>
<th>ADT 2012</th>
<th>ADT 2022</th>
<th>ADT 2032</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3900</td>
<td>3978</td>
<td>4396</td>
<td>4854</td>
</tr>
<tr>
<td></td>
<td>180</td>
<td>184</td>
<td>203</td>
<td>225</td>
</tr>
<tr>
<td></td>
<td>1400</td>
<td>1428</td>
<td>1578</td>
<td>1742</td>
</tr>
<tr>
<td>PV</td>
<td>2320</td>
<td>2366</td>
<td>2614</td>
<td>2864</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Years</th>
<th>PROJECTED</th>
<th>PROJECTED</th>
<th>PROJECTED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Present Data</td>
<td>10YR Data</td>
<td>20YR Data</td>
</tr>
</tbody>
</table>

**MINE WILL BE OPERATING AT A RATE OF 150 LOADED TRUCKS PER DAY. MINE WILL NOT OPERATE WEEKENDS. THIS IS A CLASS II ROAD**

**NORMAL TF**

(ASUME: SUBTRACT 200 TPD FROM TOTAL MU, USE 10YR TRAFFIC.)

\[
TF = 20 \left[ \frac{196.15}{11.26} + \frac{249.12}{2614} \right] = 0.0158764
\]

**MINE TRAFFIC TF**

*MINE TRUCKS ARE LOADED AT 80%*  
*TYPICAL AXLE LOAD DISTRIBUTION:*

\[
\begin{array}{ccc}
18k & 8k & 18k \\
\downarrow & \downarrow & \downarrow \\
0.89 & 0.86 & 1.00
\end{array}
\]

**EQUIVALENT TON-MILE = 2.02**

---

**SHEET TOTAL**

**DESCRIPTION**

**FLEXIBLE PAVEMENT DESIGN**

**REVISED BY:**  
**DATE:**
HIRE OPERATES 5 DAYS A WEEK (NO WEEKENDS). 24 HRS A DAY. YEAR 2012 WILL HAVE 261 WORKDAYS. ASSUME HOLIDAYS ON NEW YEAR'S, 4TH OF JULY, MEMORIAL DAY, THANKSGIVING, AND CHRISTMAS.

256 WORKDAYS / YEAR

\[ TF_{\text{Hire}} = \frac{150 \times 3.05 \times 256 \times 20}{1,000,000} \]

\[ TF = \frac{2.34}{1} \]

\[ TF_{\text{Design}} = 2.34 + 5.03 = 7.37 \]

ACCUARATE FOR DESIGN FIG. 54-2C

- SSR (SUBGRADE SUPPORT RATING) \rightarrow POOR
- ASPHALT BINDER GRADE PG 64-22
- HMA MIXTURE TEMPERATURE 80.5 °F 54-5 C
- HMA MIXTURE MODULUS \( E_{\text{hna}} \) 54-5.0
  \[ E_{\text{hna}} = 2110 \]
- HMA STRAIN
  \[ [69 MICROSTRAIN] \]
- HMA PAVEMENT THICKNESS 54-5 F
  \[ [USE 13 INCHES] \]

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>UNIT</th>
<th>CODE NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLEXIBLE PAVEMENT DESIGN</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SHEET TOTAL

1. SHEET 2 OF 2

REVISED BY: DATE: 
## IDOT DISTRICT 9

**JOB DESCRIPTION:** Prop. Special project on IL 142 from Mine Haul Rd. to 0.4 mile South of Mine Haul Rd. at Sta. 210+00 to Sta. 235+45

<table>
<thead>
<tr>
<th>EXIST. 2010</th>
<th>2012 (1.020)</th>
<th>2022 (1.105)</th>
<th>2032 (1.220)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADT 3900</td>
<td>3978</td>
<td>4376</td>
<td>4854</td>
</tr>
<tr>
<td>SH 180</td>
<td>184</td>
<td>203</td>
<td>225</td>
</tr>
<tr>
<td>MI 1400</td>
<td>1428</td>
<td>1578</td>
<td>1742</td>
</tr>
<tr>
<td>PV 2320</td>
<td>2368</td>
<td>2614</td>
<td>2884</td>
</tr>
</tbody>
</table>

**(2 ROADS)**

PROJECTED PROJECTED PROJECTED
PROMENET 10 YR DATA 20 YR DATA

Mine will be operating at a rate of 150 loading trucks per week. Mine will not operate weekends. This is a class II road.

* NORMAL TF

(assume: subtract 300 TPD from total Mi. Use: 10 YR traffic only)

\[
TF = 2.0 \left( \frac{0.15 (0.5) (2.614) + (135.78) (0.5) (20) + (567.21) (0.5) (12.46)}{1,000,000} \right)
\]

\[
TF = 9.35
\]

* MINE TRAFFIC FACTOR

Mine trucks AVE 1 load only at 9.5 M.P.H.

**TYPICAL A.M. & D.M. DISTRIBUTIONS**

<table>
<thead>
<tr>
<th>12K</th>
<th>32K</th>
<th>18K</th>
<th>18K</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.18</td>
<td>1.49</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

**EQUIVALENCY FACTOR**

\[
\left[ \frac{3.67}{\text{EQUIVALENCY FACTOR}} \right]
\]

### SHEET TOTAL

### SHEET 1 OF 2

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>UNIT</th>
<th>CODE NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>RIGID PAVEMENT DESIGN</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**REVISED BY:** __________ DATE:** __________
MINES OPERATES 5 DAYS A WEEK (NO WEEKENDS) 24 HRS A DAY. YEAR 2012 WILL HAVE 261 WORKDAYS. ASSUME HOLIDAYS ON NEW YEAR'S, JULY 4TH, MEMORIAL DAY, THANKS GIVING AND CHRISTMAS.

USE 256 WORKDAYS / YEAR

\[ TF = \frac{(150)(3.67)(256)(20)}{1,000,000} \implies [\frac{TF}{100,000} = 2.82] \]

- DESIGN TRAFFIC FACTOR
  \[ 2.82 + 7.85 \implies [\frac{TF}{100,000} = 10.17] \]

- SSR [POOR]

- EDGE SUPPORT
  [TIED SHOULDER]

- PAVEMENT THICKNESS Fig. 5/1-4/b
  7.8 INCHES [USE 10 INCHES]

<table>
<thead>
<tr>
<th>SHEET TOTAL</th>
</tr>
</thead>
</table>

| SHEET 2 OF 2 |

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>UNIT</th>
<th>CODE NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>RIGID PAVEMENT DESIGN (PCC)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

REVISED BY: _____ DATE: _____
### IDOT Mechanistic Pavement Design

**Project and Traffic Inputs**

- **Route:** ILL 142
- **Section:** 125R-1
- **County:** Sallie
- **Location:** Near Willow Creek Mine entrance

<table>
<thead>
<tr>
<th>Facility Type</th>
<th>Other Marked State Route</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Lanes</td>
<td>2 or 3</td>
</tr>
<tr>
<td>Part of future 4 lanes or more?</td>
<td>No</td>
</tr>
<tr>
<td>One Way Street?</td>
<td>No</td>
</tr>
<tr>
<td>Road Class:</td>
<td>II</td>
</tr>
<tr>
<td>Subgrade Support Rating (SSR):</td>
<td>Poor</td>
</tr>
<tr>
<td>Construction Year:</td>
<td>2012</td>
</tr>
<tr>
<td>Design Period (DP):</td>
<td>20 years</td>
</tr>
</tbody>
</table>

**Traffic Factor Calculation**

**Flexible Pavement**

- Cpv = -
- Ca = -
- Cmu = -
- TF flexible (Actual) = -
- TF flexible (Min) = -

**Rigid Pavement**

- Cp = -
- Ca = -
- Cmu = -
- TF rigid (Actual) = -
- TF rigid (Min) = -

**Additional Design Inputs and Flexible & Rigid Pavement Thickness Calculations**

- **HMA Pavement**
  - Use TF flexible = 7.37
  - PG Grade Lower Binder Lifts = 60.5 deg. (Figure 53.4.R)
  - HMA Mixture Temp. (E_{max}) = 544 ksr (Figure 53.4.D)
  - Design HMA Mixture Strain (E_{max}) = 68 (Figure 53.4.E)

- **JPCP Pavement**
  - Use TF rigid = 10.17
  - Edge Support = Tied Shoulder or C.S.G.
  - Rigid Pav. Thick. = 9.88 in. (Figure 53.4.E)

**Design Tables from BDE Manual Chapter 54 - Pavement Design**

<table>
<thead>
<tr>
<th>Class I Roads</th>
<th>Class II Roads</th>
<th>Class III Roads</th>
<th>Class IV Roads</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 lanes or more</td>
<td>2 lanes with ADT &gt; 2000</td>
<td>2 Lanes</td>
<td>2 Lanes</td>
</tr>
<tr>
<td>Part of a future 4 lanes or more</td>
<td>One-way Street with ADT &lt;= 3500</td>
<td>(ADT 750 - 2000)</td>
<td>(ADT &lt; 750)</td>
</tr>
<tr>
<td>One-way Streets with ADT &gt; 3500</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Traffic Factor ESAL Coefficients**

- Class Table for One-Way Streets
  - ADT Class
  - 0 - 3500: II
  - >3501: I

- Class Table for 2 or 3 lanes (not future 4 lane & not one-way street)
  - ADT Class
  - 0 - 749: IV
  - 750 - 2000: III
  - >2000: II

**Design Lane Distribution Factors for Structural Design Traffic (Figure 54.2.B)**

<table>
<thead>
<tr>
<th>Number of Lanes</th>
<th>Rural</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Lane Ramp</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>2 or 3</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>4</td>
<td>32%</td>
<td>45%</td>
</tr>
<tr>
<td>6 or more</td>
<td>20%</td>
<td>40%</td>
</tr>
</tbody>
</table>

**Structural Design Traffic**

- Minimum ADT = 0
- Actual ADT = 2,614
- Actual % of ADT In Total ADT = 64.3%
- % of ADT In Design Lane = 50%
- PV = 0
- SU = 250
- MU = 750

**Structural Design ADT = 4,083 (2022)**