

# APPENDIX

## DETAILED DEFINITIONS TO HIGHWAY NEEDS ANALYSIS REPORT DATA

### IDENTIFICATION

FEDERAL-AID SYSTEM - The federal-aid designation of the segment:

NHS-IN - National Highway System-Interstate  
NHS-NI - National Highway System-Non-Interstate  
STP - Surface Transportation Program  
NON-FA - Non-Federal-aid

FUNDING CATEGORY - The Department of Transportation's designated funding category for the segment.

INT - Interstate  
MAJA - Major Arterial  
MINA - Minor Arterial  
SEC - State Secondary  
NFA - Non-Federal-Aid  
URB - Urban  
MUNI - Municipal

FUNCTIONAL CLASSIFICATION - The functional classification of the segment

R-INT - Rural Interstate  
U-INT - Urban Interstate  
R-F&E - Rural Expressways  
U-F&E - Urban Expressways  
R-P A - Rural Principal Arterial  
U-P A - Urban Principal Arterial  
R-MI A - Rural Minor Arterial  
U-MI A - Urban Minor Arterial  
R-MA C - Rural Major Collector  
U-COLL - Urban Collector  
R-MI C - Rural Minor Collector  
R-LO R - Rural Local Road  
U-LO S - Urban Local Street

DIRECTION - The direction of travel for divided routes:

N - North Bound Lanes  
S - South Bound Lanes  
E - East Bound Lanes  
W - West Bound Lanes

BEGINNING MRM (Mileage Reference Marker) - The markers used to reference the location of any occurrence along the highway. The beginning MRM as used in this report is the reference point of the beginning of the segment being analyzed. The actual beginning of the segment may be displaced slightly from the mileage marker.

MRM DISPLACEMENT - The distance, in thousandths of miles, from the MRM in place alongside the roadway to the beginning of the segment.

SEGMENT LENGTH - The length of the highway segment shown to the nearest one-thousandth of a mile.

YEAR BUILT - The year the existing grade was constructed.

YEAR LAST IMPROVED - The year the existing asphalt surface was last placed or the year the existing PCCP surface was last rehabilitated.

YEAR LAST SEALED - The year the last surface treatment was applied to the surface. This includes chip seals and sand seals. Crack sealing is not included. This only applies to asphalt surfaces.

## ROADWAY CONDITIONS

SURFACE CONDITION INDEX - A calculated index of the individual indices (excluding roughness for urban segments) that are used to rate pavement distress. The data that is used to compute this index is gathered on a yearly basis. The following equation was developed to compute the surface condition index:

$$\text{COMP} = \text{mean} - 1.25 \times \text{sd}$$

where: COMP = The composite condition index  
 mean = The mean of all contributing individual condition indexes  
 sd = The standard deviation for the above mean.

The following table provides a reference of composite index values:

Composite Index Values	Rating
5.00 to 4.50	Excellent
4.49 to 3.40	Good
3.39 to 2.10	Fair
2.09 to 0.00	Poor

The distress indexes used to calculate the mean and standard deviation values vary upon the pavement type and the existence of D-cracking/ASR. The differences are due to the fact that many of the distress types will only occur on certain pavement types. Use of these distresses on other pavement types would skew the composite index. Based on pavement type, the following indexes are used:

### Flexible Pavements

Pavement Type	Transverse Cracking	Fatigue Cracking	Patching / Patch Deterioration	Block Cracking	Rut Depth	Roughness
FD	Yes	yes	yes	yes	yes	yes
THK	Yes	yes	yes	yes	yes	yes
TONS	Yes	yes	yes	yes	yes	yes
TONW	Yes	yes	yes	yes	yes	yes
AONC	Yes	yes	yes	yes	yes	yes
BLOT	Yes	yes	yes	yes	yes	yes

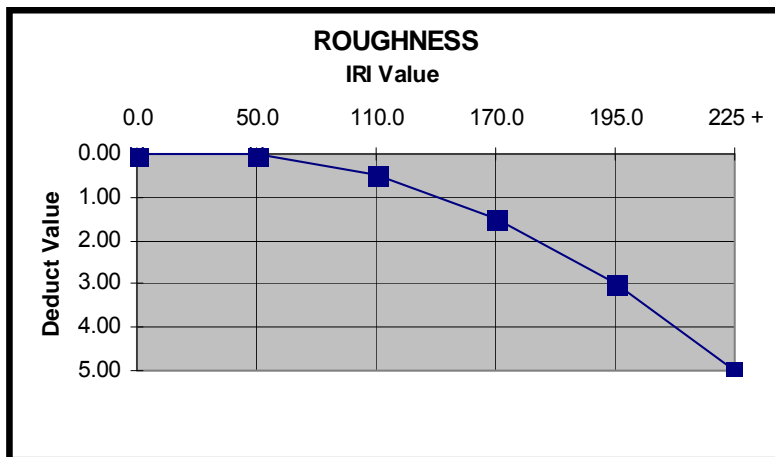
**Note:** In Urban areas the roughness index is excluded from this calculation.

## Rigid Pavements

Pavement Type	D & ASR Cracking	Punchouts	Corner Cracking	Faulting	Joint Seal	Joint Spalling	Roughness
CRCP	no if = 5	yes	no	no	no	no	yes
TKSJ	no if = 5	no	yes	yes	no	yes	yes
TKSJD	no if = 5	no	yes	yes	no	yes	yes
TNSJ	no if = 5	no	yes	yes	no	yes	yes
MESH	no if = 5	no	yes	yes	no	yes	yes

**NOTE:** For segments with Surface Type equal to "BRDG", this value refers to the FHWA Bridge rating divided by 20. To get the actual FHWA Bridge Rating value, multiply this number by 20, i.e. 3.55 x 20 = FHWA Bridge Rating of 71.

**ROUGHNESS INDEX** - An index of the rideability of the road section. A numeric rating of 0 to 5.0 is computed with 5.0 being a perfect rating. The data used to compute this index is collected from 75 percent of the highway system on a yearly basis. This rating is collected by the profilometer and is determined by subtracting the deduct value from 5.0. The first number is the index value. A value of 5.00 indicates no test data available. The second number in parenthesis is the year the data was collected. A value of \*\* indicates that the value was manually adjusted while "--" indicates no data is available. The deduct values are calculated based on the following graph:



Roads are rated in approximate 1/4 mile segments. The ratings are then averaged for the segment length. Roughness data for urban segments should be viewed critically as the data collection process does not lend itself well in these areas.

**NOTE:** In 1999, the Department of Transportation switched from the South Dakota Roughness index (SDI) to the International Roughness Index (IRI).

## ASPHALT INDEX VALUES

**TRANSVERSE CRACKING** - An index of the cracks that are perpendicular to the pavement centerline. A numeric rating of 0 to 5.0 with 5.0 being a perfect rating is calculated using visual distress survey data. This rating is determined by subtracting the deduct value from 5.0. The deduct values follow:

TRANSVERSE CRACKING			
SEVERITY	EXTENT		
	Low >50' spacing	Moderate >25' & <50' spacing	High < 25' spacing
Low (<1/4" width or routed & sealed crack < 1/2")	0.1	0.2	0.5
Medium (>1/4" width & <1/4" depressions)	0.2	0.6	1.5
High >1 inch or (>1/4" width & >1/4" depressions)	1.0	2.2	5.0

Roads are rated in approximate 1/4 mile segments. The ratings are then averaged for the segment length. The first number is the index value. The second number in parenthesis is the year the data was collected. A value of \*\* indicates that the value was manually adjusted while "--" indicates no date data is available.

**FATIGUE CRACKING** - An index of a series on interconnecting cracks that resemble alligator skin or chicken wire. A numeric rating of 0 to 5.0 with 5.0 being a perfect rating is calculated using visual distress survey data. This rating is determined by subtracting the deduct value from 5.0. The deduct values follow:

FATIGUE CRACKING				
SEVERITY	EXTENT			
	Low 1% - 9% of wheel path	Moderate 10% - 24% of wheel path	High 25% - 49% of wheel path	Extreme >49% of wheel path
Low (Fine parallel cracks in the wheel path)	0.4	0.8	1.4	2.0
Medium (Alligator pattern clearly developed in the wheel path)	0.8	1.7	3.1	5.0
High (Alligator pattern clearly developed with spalling and distortion in the wheel path)	1.1	2.7	5.0	5.0

Roads are rated in approximate 1/4 mile segments. The ratings are then averaged for the segment length. The first number is the index value. The second number in parenthesis is the year the data was collected. A value of \*\* indicates that the value was manually adjusted while "--" indicates no date data is available.

**PATCHING/PATCH DETERIORATION** - An index of an area where a portion of the pavement surface has been overlaid or replaced. A numeric rating of 0 to 5.0 with 5.0 being a perfect rating is calculated using visual distress survey data. This rating is determined by subtracting the deduct value from 5.0. The deduct values follow:

PATCHING/PATCH DETERIORATION				
SEVERITY	EXTENT			
	Low 1% - 9% of segment	Moderate 10% - 24% of segment	High 25% - 49% of segment	Extreme >49% of segment
Low (Little or no defects with smooth ride)	0.4	0.8	1.4	2.0
Medium (Clear signs of cracking on notable roughness)	0.8	1.7	3.1	5.0
High (Heavy cracking or other distress with distinct roughness)	1.1	2.7	5.0	5.0

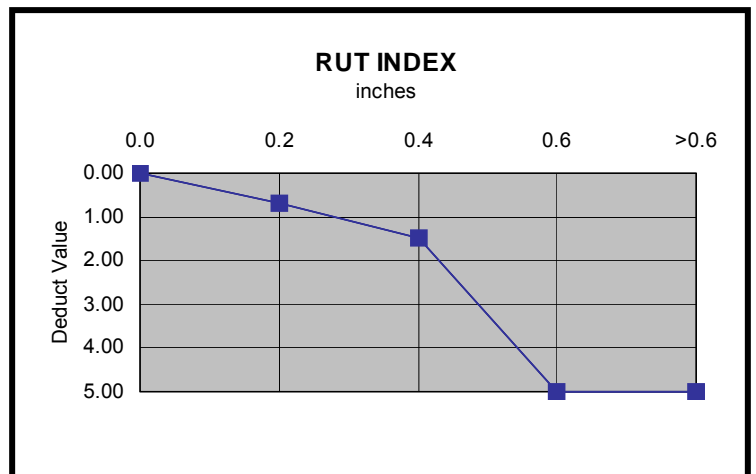
Roads are rated in approximate 1/4 mile segments. The ratings are then averaged for the segment length. The first number is the index value. A value of 5.00 indicates no test data available. The second number in parenthesis is the year the data was collected. A value of \*\* indicates that the value was manually adjusted while "-" indicates no date data is available.

**BLOCK CRACKING** - An index of cracks that appear to divide the surface into approximately rectangular pieces. A numeric rating of 0 to 5.0 with 5.0 being a perfect rating is calculated using visual distress survey data. This rating is determined by subtracting the deduct value from 5.0. The deduct values follow:

BLOCK CRACKING			
SEVERITY	EXTENT		
	Low 1% - 9% of the section	Moderate 10% - 49% of the section	High >50% of the section
Low (>6' per block sizes)	0.7	1.2	2.0
Medium (3' to 6' block sizes)	0.8	1.6	3.0
High (<3' block sizes)	0.9	2.2	5.0

Roads are rated in approximate 1/4 mile segments. The ratings are then averaged for the segment length. The first number is the index value. A value of 5.00 indicates no test data available. The second number in parenthesis is the year the data was collected. A value of \*\* indicates that the value was manually adjusted while "-" indicates no date data is available.

**RUT INDEX** - An index of surface depressions that occur in the wheel path. The rut depth is collected by the profilometer. The data used to compute this index is collected from 75 percent of the highway system on a yearly basis. A numeric rating of 0 to 5.0 is computed with 5.0 being a perfect rating. This rating is determined by subtracting the deduct value from 5.0. The deduct values are calculated based on the following graph:



Roads are rated in approximate 1/4 mile segments. The ratings are then averaged for the segment length. The first number is the index value. A value of 5.00 indicates no test data available. The second number in parenthesis is the year the data was collected. A value of \*\* indicates that the value was manually adjusted while "-" indicates no date data is available. This data in the parenthesis also applies to the RUT DEPTH (INCHES) AVG/MAX data which follows next.

**RUT DEPTH (INCHES) AVG/MAX** – Rut Depth AVG is the average rut depth in inches for the segment. This value is back calculated from the Rut Index. Since rut depths of 0.6” or greater are assigned a “0” value, the actual average rut depth may be greater but will be reported as 0.6”. Rut Depth Max is the maximum ‘DRS’ (Distress/Rut/Sufficiency) section rut depth value for the analysis segment. Rut data is collected continuously along the road. The data is then broken into 50 foot ‘DRS’ sections and rut values are calculated for each section. The 50 foot ‘DRS’ test section values are the average rut within that 50 foot section. The maximum depth value on this report is obtained by selecting the maximum calculated rut value from all the 50 foot ‘DRS’ test sections within the analysis segment.

## CONCRETE INDEX VALUES

**D-CRACKING/ASR** - An index of cracking that appears as a series of closely spaced hairline surface cracks that often causes dark coloring of the surface in the surrounding area. A numeric rating of 0 to 5.0 with 5.0 being a perfect rating is calculated using visual distress survey data. This rating is determined by subtracting the deduct value from 5.0. The deduct values follow:

D-CRACKING & ASR				
SEVERITY	EXTENT			
	Low 1% - 9% of slabs	Moderate 10% - 24% of slabs	High 25% - 49% of slabs	Extreme >49% of slabs
Low (Cracks are light, with no loose or missing pieces)	0.4	0.6	0.8	1.0
Medium (Cracks are well defined and some small pieces are loose or missing)	1.0	1.7	3.1	5.0
High (Cracks are well developed pattern with a significant amount of loose or missing material)	1.1	2.7	5.0	5.0

Roads are rated in approximate 1/4 mile segments. The ratings are then averaged for the segment length. The first number is the index value. A value of 5.00 indicates no test data available. The second number in parenthesis is the year the data was collected. A value of \*\* indicates that the value was manually adjusted while “-” indicates no date data is available.

**JOINT SPALLING** - An index of cracking, breaking, chipping, or fraying of the slab edges within two feet of a joint or crack. A numeric rating of 0 to 5.0 with 5.0 being a perfect rating is calculated using visual distress survey data. This rating is determined by subtracting the deduct value from 5.0. The deduct values follow:

JOINT SPALLING				
SEVERITY	EXTENT			
	Low 1% - 9% of joints	Moderate 10% - 24% of joints	High 25% - 49% of joints	Extreme >49% of joints
Low (Spalls < 3” wide with no significant loss of material)	0.4	0.7	1.0	1.5
Medium (Spalls 3” to 6” with loss of material)	0.6	1.2	2.0	3.0
High (Spalls > 6” with significant loss of material)	0.8	1.7	3.2	5.0

Roads are rated in approximate 1/4 mile segments. The ratings are then averaged for the segment length. The first number is the index value. A value of 5.00 indicates no test data available. The second number in parenthesis is the year the data was collected. A value of \*\* indicates that the value was manually adjusted while "--" indicates no date data is available.

**CORNER CRACKING** - An index of cracking that appears to extend vertically through the entire slab which intersect the joints at a distance less than six feet from the corner of the slab. A numeric rating of 0 to 5.0 with 5.0 being a perfect rating is calculated using visual distress survey data. This rating is determined by subtracting the deduct value from 5.0. The deduct values follow:

CORNER CRACKING				
SEVERITY	EXTENT			
	Low 1% - 9% of slabs	Moderate 10% - 24% of slabs	High 25% - 49% of slabs	Extreme >49% of slabs
Low (Cracks not spalled with no faulting & piece not broken)	0.4	0.8	1.4	2.0
Medium (Crack spalled slightly, or faulting < 1/2", or piece broken)	0.8	1.7	3.1	5.0
High (Cracks spalled, or faulting > 1/2", or piece broken)	1.1	2.7	5.0	5.0

Roads are rated in approximate 1/4 mile segments. The ratings are then averaged for the segment length. The first number is the index value. A value of 5.00 indicates no test data available. The second number in parenthesis is the year the data was collected. A value of \*\* indicates that the value was manually adjusted while "--" indicates no date data is available.

**FAULTING** - An index of the difference in elevation across a joint or a crack. The data used to compute this index is collected from 75 percent of the highway system on a yearly basis. A numeric rating of 0 to 5.0 with 5.0 being a perfect rating is calculated using visual distress survey data. This rating is determined by subtracting the deduct value from 5.0. The deduct values are calculated based on the following formula:

**NEW FAULTING INDEX ALGORITHM**

A continuous analog of the discrete (binned) equation is:

$$D = \min \left[ 5, \frac{1}{N} \sum_{f=1}^F d_f \right]$$

where

$h_f$  = the (average) height of fault  $f$ , in inches

$N$  = the total number of joints

$d_f$  is the deduct value for an individual fault  $f$ :

$$d_f = 24 (|h_f| - 0.05) \quad (|h_f| \geq 0.05)$$

$$= 0 \quad (|h_f| < 0.05)$$

The total deduct value  $D$  cannot exceed 5

The Faulting Index for the Pavement Management System remains:

$$F = 5 - D$$

Roads are rated in approximate 1/4 mile segments. The ratings are then averaged for the segment length. The first number is the index value. A value of 5.00 indicates no test data available. The second number in parenthesis is the year the data was collected. A value of \*\* indicates that the value was manually adjusted while "--" indicates no date data is available.

**JOINT SEAL DAMAGE** - The condition index for joint seal damage on rigid pavements. A numeric rating of 0 to 5.0 with 5.0 being a perfect rating is calculated using visual distress survey data. This rating is determined by subtracting the deduct value from 5.0. The deduct values follow:

JOINT SEAL DAMAGE				
SEVERITY	EXTENT			
	Low 1% - 9% of joints	Moderate 10% - 24% of joints	High 25% - 49% of joints	Extreme >49% of joints
Low (Damage to < 10% of joint)	0.4	0.7	1.0	1.5
Medium (Damage to 10% to 50% of joint)	0.6	1.2	2.0	3.0
High (Damage to > 50% of joint)	0.8	1.7	3.2	5.0

Roads are rated in approximate 1/4 mile segments. The ratings are then averaged for the segment length. The first number is the index value. A value of 5.00 indicates no test data available. The second number in parenthesis is the year the data was collected. A value of \*\* indicates that the value was manually adjusted while "-" indicates no date data is available.

**PUNCHOUTS** - An index of an area enclosed by two closely spaced (usually less than two feet) transverse cracks, a short longitudinal crack, and the edge of the pavement or a longitudinal joint. Will normally occur on continuously reinforced concrete only. A numeric rating of 0 to 5.0 with 5.0 being a perfect rating is calculated using visual distress survey data. This rating is assigned using the visual distress survey and is determined by subtracting the deduct value from 5.0. The deduct values follow:

PUNCHOUTS			
SEVERITY	EXTENT		
	Low < 10 per mile	Moderate 10 to 25 per mile	High >25 per mile
All levels	0.8	1.7	3.2

Roads are rated in approximate 1/4 mile segments. The ratings are then averaged for the segment length. The first number is the index value. A value of 5.00 indicates no test data available. The second number in parenthesis is the year the data was collected. A value of \*\* indicates that the value was manually adjusted while "-" indicates no date data is available.

## STRUCTURAL DESCRIPTION

**SURFACE TYPE** - The prevailing surface type of the driving lanes. The SDDOT pavement management system defines the following surface types:

- **ASPHALT SURFACES**
  - AONC - Asphalt Concrete Pavement overlay on PCCP
  - FD - Full Depth Asphalt Concrete Pavement (> 10")
  - THK - Thick Asphalt Concrete Pavement  
(Pavement thickness  $\geq$  5" to < 10")
  - TONS - Thin on Strong Asphalt Concrete Pavement  
(Pavement thickness < 5" and granular base  $\geq$  8")
  - TONW - Thin on Weak Asphalt Concrete Pavement  
(Pavement thickness < 5" and granular base < 8")
  - BLOT - Bituminous Surface Treatment or oil aggregate surface



- CONCRETE SURFACES

- CRCP - Continuous Reinforced Concrete Pavement
- MESH - Mesh Reinforced Concrete Pavement
- TKSJ - Thick Short Jointed Concrete Pavement  
(Pavement thickness  $\geq 8''$  and  $\leq 20'$  joint spacing without dowels)
- TKSJD - Thick Short Jointed Doweled Concrete Pavement  
(Pavement thickness  $\geq 8''$  and  $\leq 20'$  joint spacing with dowels)
- TNSJ - Thin Short Jointed Concrete Pavement  
(Pavement thickness  $< 8''$  and  $\leq 20'$  joint spacing without dowels)

- OTHER

- BRDG - Bridge 500' or longer
- GRAV - Gravel Surface
- OTHR - Other Pavement (brick paver, etc.)

SHOULDR TYPE – PRIM/SECNDRY - The prevailing surface type of the shoulder. The first abbreviation refers to predominant shoulder type closest to the driving lane. The second abbreviation refers to predominant shoulder type on the outer edge of the road. The shoulder starts at the white line on the right side of the road and extends toward the ditch. The following shoulder abbreviations are defined as such:

- AC - Asphalt Concrete surfacing
- BLOT - Bituminous Surface treatment or oil aggregate surface
- C&G - Curb and Gutter.
- GRASS - Grass or sod surface
- GRVL - Gravel or stone surface
- N/D - No Data Available
- NONE - No shoulders.
- OTHER - Other (curb & gutter on one side only)
- PCCP - Portland Cement Concrete Pavement (may include curb & gutter)
- SOIL - Soil or dirt surface
- RECYL - Recycled (AC/Gravel)

SURF WIDTH – PREDOMIN (MIN) - The prevailing width of the surfaced driving lanes. This width is determined from construction plans and is based on the portion of the road that has full structural strength. This measurement may include curb to curb width (which includes parking lanes), but excludes shoulders and median. Widening at intersections or turning lanes is not included. The first number is the predominant surface width within the segment. The second number in parenthesis is the minimum width within the segment.

LF SHLDR WIDTH-PRIM/SECNDRY - Facing the highway in ascending MRM direction, the prevailing width of the left shoulder to the nearest foot. The first number is the predominant left shoulder width of the primary shoulder type. The second number in parenthesis is the minimum left shoulder width of the primary shoulder type. The third number is the predominant left shoulder width of the secondary shoulder type. The fourth number in parenthesis is the minimum left shoulder width of the secondary shoulder type. Blank fields indicate no shoulders.

RT SHLDR WIDTH-PRIM/SECNDRY - Facing the highway in ascending MRM direction, the prevailing width of the right shoulder to the nearest foot. The first number is the predominant right shoulder width of the primary shoulder type. The second number in parenthesis is the minimum right shoulder width of the primary shoulder type. The third number is the predominant right shoulder width of the secondary shoulder type. The fourth number in parenthesis is the minimum right shoulder width of the secondary shoulder type. Blank fields indicate no shoulders.

WIDTHS-RDWY/ROW-PREDOMMIN – The widths of various portions of the highway. The first number indicates the prevailing roadway width to the nearest foot. The second number indicates the prevailing right-of-way width to the nearest foot. The third number (which is in parenthesis) is the minimum right of way width within the segment.

ROADBED LAYERS - The first grouping shows the year of the layer. The second grouping shows the layer type. The last grouping shows the thickness of the layer. The layers are listed by age from newest to oldest. The layers should provide a cross section of the roadbed. Up to 12 layers can be displayed in this report. The alphabetic combinations listed below identify the makeup of the various roadbed layers. NOTE: The size noted below refers to the maximum aggregate size within the layer.

Code	Description	Code	Description
000	No Data	AE7	Asphalt-Class E Graded 3/8"
A	Asphalt No Data	AE8	Asphalt-Class E Open Grad 3/8"
AA	Asphalt-Additional Found	AF	Asphalt-Class F No Data
AA1	Asphalt-Add. Top Sand	AF1	Asphalt-Class F Top Sand
AA2	Asphalt-Add. Top 1/2"	AF2	Asphalt-Class F Top 1/2"
AA3	Asphalt-Add. Top 3/4"	AF3	Asphalt-Class F Top 3/4"
AA4	Asphalt-Add. Top 1"	AF4	Asphalt-Class F Top 1"
AA5	Asphalt-Add. Top 1 1/4"	AF5	Asphalt-Class F Top 1 1/4"
AA6	Asphalt-Add. Top 1 1/2"	AF6	Asphalt-Class F Top 1 1/2"
AA7	Asphalt-Add. Graded 3/8"	AF7	Asphalt-Class F Grad 3/8"
AA8	Asphalt-Add. Open Grad 3/8"	AF8	Asphalt-Class F Open Grad 3/8"
AB	Asphalt-Class Q1-No Data Recycle	AG	Asphalt-Class G No Data
AB1	Asphalt-Class Q1 Top Sand Recycle	AG1	Asphalt-Class G Top Sand
AB2	Asphalt-Class Q1 Top 1/2" Recycle	AG2	Asphalt-Class G Top 1/2"
AB3	Asphalt-Class Q1 Top 3/4" Recycle	AG3	Asphalt-Class G Top 3/4"
AB4	Asphalt-Class Q1 Top 1" Recycle	AG4	Asphalt-Class G Top 1"
AB5	Asphalt-Class Q1 Top 1 1/4" Recycle	AG5	Asphalt-Class G Top 1 1/4"
AB6	Asphalt-Class Q1 Top 1 1/2" Recycle	AG6	Asphalt-Class G Top 1 1/2"
AB7	Asphalt-Class Q1 Graded 3/8" Recycle	AG7	Asphalt-Class G Grad 3/8"
AB8	Asphalt-Class Q1 Open Grad 3/8" Recycle	AG8	Asphalt-Class G Open Grad 3/8"
AC	Asphalt-Cold Recyl. No Data	AH	QA/QC-High Traffic No Data
AC1	Asphalt-Cold Recyl. Top Sand	AH1	QA/QC-High Traffic Top Sand
AC2	Asphalt-Cold Recyl. 1/2"	AH2	QA/QC-High Traffic Top 1/2"
AC3	Asphalt-Cold Recyl. 3/4"	AH3	QA/QC-High Traffic Top 3/4"
AC4	Asphalt-Cold Recyl. 1"	AH4	QA/QC-High Traffic Top 1"
AC5	Asphalt-Cold Recyl. 1 1/4"	AH5	QA/QC-High Traffic Top 1 1/4"
AC6	Asphalt-Cold Recyl. 1 1/2"	AH6	QA/QC-High Traffic Top 1 1/2"
AC7	Asphalt-Cold Recyl. Graded 3/8"	AH7	QA/QC-High Traffic Grad 3/8"
AC8	Asphalt-Cold Recyl. Open Grad 3/8"	AH8	QA/QC-High Traffic Open Grad 3/8"
AD	Asphalt-Class D No Data	AI	Asphalt-Class No Data
AD1	Asphalt-Class D Top Sand	AI1	Asphalt-Class I Top Sand
AD2	Asphalt-Class D Top 1/2"	AI2	Asphalt-Class I Top 1/2"
AD3	Asphalt-Class D Top 3/4"	AI3	Asphalt-Class I Top 3/4"
AD4	Asphalt-Class D Top 1"	AI4	Asphalt-Class I Top 1"
AD5	Asphalt-Class D Top 1 1/4"	AI5	Asphalt-Class I Top 1 1/4"
AD6	Asphalt-Class D Top 1 1/2"	AI6	Asphalt-Class I Top 1 1/2"
AD7	Asphalt-Class D Graded 3/8"	AI7	Asphalt-Class I Grad 3/8"
AD8	Asphalt-Class D Open Grad 3/8"	AI8	Asphalt-Class I Open Grad 3/8"
AE	Asphalt-Class E No Data	AJ	Asphalt-Class Q2-No Data Recycle
AE1	Asphalt-Class E Top Sand	AJ1	Asphalt-Class Q2 Top Sand Recycle
AE2	Asphalt-Class E Top 1/2"	AJ2	Asphalt-Class Q2 Top 1/2" Recycle
AE3	Asphalt-Class E Top 3/4"	AJ3	Asphalt-Class Q2 Top 3/4" Recycle
AE4	Asphalt-Class E Top 1"	AJ4	Asphalt-Class Q2 Top 1" Recycle
AE5	Asphalt-Class E Top 1 1/4"	AJ5	Asphalt-Class Q2 Top 1 1/4" Recycle
AE6	Asphalt-Class E Top 1 1/2"	AJ6	Asphalt-Class Q2 Top 1 1/2"

AJ7	Asphalt-Class Q2 Graded 3/8" Recycle	AQ5	QA/QC-Medium Traffic Top 1 1/4" Recycle
AJ8	Asphalt-Class Q2 Open Grad 3/8" Recycle	AQ6	QA/QC-Medium Traffic Top 1 1/2" Recycle
AK	Asphalt-Class Q3-No Data Recycle	AQ7	QA/QC-Medium Traffic Grad 3/8" Recycle
AK1	Asphalt-Class Q3 Top Sand Recycle	AQ8	QA/QC-Medium Traffic Open Grad 3/8" Rec
AK2	Asphalt-Class Q3 Top 1/2" Recycle	AR	Asphalt-Hot Recyl. No Data
AK3	Asphalt-Class Q3 Top 3/4" Recycle	AR1	Asphalt-Hot Recyl. Top Sand
AK4	Asphalt-Class Q3 Top 1" Recycle	AR2	Asphalt-Hot Recyl. 1/2"
AK5	Asphalt-Class Q3 Top 1 1/4" Recycle	AR3	Asphalt-Hot Recyl. 3/4"
AK6	Asphalt-Class Q3 Top 1 1/2" Recycle	AR4	Asphalt-Hot Recyl.1"
AK7	Asphalt-Class Q3 Graded 3/8" Recycle	AR5	Asphalt-Hot Recyl. 1 1/4"
AK8	Asphalt-Class Q3 Open Grad 3/8" Recycle	AR6	Asphalt-Hot Recyl. 1 1/2"
AL	QA/QC-Low Traffic No Data	AR7	Asphalt-Hot Recyl. Graded 3/8"
AL1	QA/QC-Low Traffic Top Sand	AR8	Asphalt-Hot Recyl. Open Grad 3/8"
AL2	QA/QC-Low Traffic Top 1/2"	AS	Asphalt-Class S No Data
AL3	QA/QC-Low Traffic Top 3/4"	AS1	Asphalt-Class S Top Sand
AL4	QA/QC-Low Traffic Top 1"	AS2	Asphalt-Class S Top 1/2"
AL5	QA/QC-Low Traffic Top 1 1/4"	AS3	Asphalt-Class S Top 3/4"
AL6	QA/QC-Low Traffic Top 1 1/2"	AS4	Asphalt-Class S Top 1"
AL7	QA/QC-Low Traffic Grad 3/8"	AS5	Asphalt-Class S Top 1 1/4"
AL8	QA/QC-Low Traffic Open Grad 3/8"	AS6	Asphalt-Class S Top 1 1/2"
AM	QA/QC-Medium Traffic No Data	AS7	Asphalt-Class S Graded 3/8"
AM1	QA/QC-Medium Traffic Top Sand	AS8	Asphalt-Class S Open Grad 3/8"
AM2	QA/QC-Medium Traffic Top 1/2"	AT2	Asphalt-Stone Matrix Top 1/2"
AM3	QA/QC-Medium Traffic Top 3/4"	AV	Asphalt-Class Q1-No Data
AM4	QA/QC-Medium Traffic Top 1"	AV1	Asphalt-Class Q1 Top Sand
AM5	QA/QC-Medium Traffic Top 1 1/4"	AV2	Asphalt-Class Q1 Top 1/2"
AM6	QA/QC-Medium Traffic Top 1 1/2"	AV3	Asphalt-Class Q1 Top 3/4"
AM7	QA/QC-Medium Traffic Grad 3/8"	AV4	Asphalt-Class Q1 Top 1"
AM8	QA/QC-Medium Traffic Open Grad 3/8"	AV5	Asphalt-Class Q1 Top 1 1/4"
AN1	Asphalt-Class Q4 Top Sand Recycle	AV6	Asphalt-Class Q1 Top 1 1/2"
AN2	Asphalt-Class Q4 Top 1/2" Recycle	AV7	Asphalt-Class Q1 Graded 3/8"
AN3	Asphalt-Class Q4 Top 3/4" Recycle	AV8	Asphalt-Class Q1 Open Grad 3/8"
AN4	Asphalt-Class Q4 Top 1" Recycle	AW	Asphalt-Class Q2-No Data
AN5	Asphalt-Class Q4 Top 1 1/4" Recycle	AW1	Asphalt-Class Q2 Top Sand
AN6	Asphalt-Class Q4 Top 1 1/2" Recycle	AW2	Asphalt-Class Q2 Top 1/2"
AN7	Asphalt-Class Q4 Graded 3/8" Recycle	AW3	Asphalt-Class Q2 Top 3/4"
AN8	Asphalt-Class Q4 Open Grad 3/8" Recycle	AW4	Asphalt-Class Q2 Top 1"
AO	QA/QC-Low Traffic No Data Recycle	AW5	Asphalt-Class Q2 Top 1 1/4"
AO1	QA/QC-Low Traffic Top Sand Recycle	AW6	Asphalt-Class Q2 Top 1 1/2"
AO2	QA/QC-Low Traffic Top 1/2" Recycle	AW7	Asphalt-Class Q2 Graded 3/8"
AO3	QA/QC-Low Traffic Top 3/4" Recycle	AW8	Asphalt-Class Q2 Open Grad 3/8"
AO4	QA/QC-Low Traffic Top 1" Recycle	AX	Asphalt-Class Q3-No Data
AO5	QA/QC-Low Traffic Top 1 1/4" Recycle	AX1	Asphalt-Class Q3 Top Sand
AO6	QA/QC-Low Traffic Top 1 1/2" Recycle	AX2	Asphalt-Class Q3 Top 1/2"
AO7	QA/QC-Low Traffic Grad 3/8" Recycle	AX3	Asphalt-Class Q3 Top 3/4"
AO8	QA/QC-Low Traffic Open Grad 3/8" Recycle	AX4	Asphalt-Class Q3 Top 1"
AP	SHRP Superpave No Data	AX5	Asphalt-Class Q3 Top 1 1/4"
AP1	SHRP Superpave Top Sand	AX6	Asphalt-Class Q3 Top 1 1/2"
AP2	SHRP Superpave Top 1/2"	AX7	Asphalt-Class Q3 Graded 3/8"
AP3	SHRP Superpave Top 3/4"	AX8	Asphalt-Class Q3 Open Grad 3/8"
AP4	SHRP Superpave Top 1"	AY	Asphalt-Class Q4-No Data
AP5	SHRP Superpave Top 1 1/4"	AY1	Asphalt-Class Q4 Top Sand
AP6	SHRP Superpave Top 1 1/2"	AY2	Asphalt-Class Q4 Top 1/2"
AP7	SHRP Superpave Grad 3/8"	AY3	Asphalt-Class Q4 Top 3/4"
AP8	SHRP Superpave Open Grad 3/8"	AY4	Asphalt-Class Q4 Top 1"
AQ	QA/QC-Medium Traffic No Data Recycle	AY5	Asphalt-Class Q4 Top 1 1/4"
AQ1	QA/QC-Medium Traffic Top Sand Recycle	AY6	Asphalt-Class Q4 Top 1 1/2"
AQ2	QA/QC-Medium Traffic Top 1/2" Recycle	AY7	Asphalt-Class Q4 Graded 3/8"
AQ3	QA/QC-Medium Traffic Top 3/4" Recycle	AY8	Asphalt-Class Q4 Open Grad 3/8"
AQ4	QA/QC-Medium Traffic Top 1" Recycle	AZ	Asphalt-Class Q5-No Data

AZ1	Asphalt-Class Q5 Top Sand	BR3	Aggregate-Recyl Asp ¾"
AZ2	Asphalt-Class Q5 Top ½"	BR4	Aggregate-Recyl Asp 1"
AZ3	Asphalt-Class Q5 Top ¾"	BR5	Aggregate-Recyl Asp 1¼"
AZ4	Asphalt-Class Q5 Top 1"	BR6	Aggregate-Recyl Asp 1½"
AZ5	Asphalt-Class Q5 Top 1 1/4"	BR8	Aggregate-Recyl Asp 2"
AZ6	Asphalt-Class Q5 Top 1 ½"	BS	Aggregate-Salvaged
AZ7	Asphalt-Class Q5 Graded 3/8"	BS1	Aggregate-Salvaged Sand
AZ8	Asphalt-Class Q5 Open Grad 3/8"	BS2	Aggregate-Salvaged ½"
B	Aggregate-No Data	BS3	Aggregate-Salvaged ¾"
BA	Aggregate-Emulsion Asphalt	BS4	Aggregate-Salvaged 1"
BA1	Aggregate-Emulsion Sand	BS5	Aggregate-Salvaged 1¼"
BA2	Aggregate-Emul. Top ½"	BS6	Aggregate-Salvaged 1½"
BA3	Aggregate-Emul. Top ¾"	BS8	Aggregate-Salvaged 2"
BA4	Aggregate-Emul. Top 1"	BU	Aggregate-Untreated
BA5	Aggregate-Emul. Top 1¼"	BU1	Aggregate-Untreated Sand
BA6	Aggregate-Emul. Top 1½"	BU2	Aggregate-Untreated ½"
BA8	Aggregate-Emul. Top 2"	BU3	Aggregate-Untreated ¾"
BB	Aggregate-Cutback Asphalt	BU4	Aggregate-Untreated 1"
BB1	Aggregate-Cutback Sand	BU5	Aggregate-Untreated 1¼"
BB2	Aggregate-Cutback ½"	BU6	Aggregate-Untreated 1½"
BB3	Aggregate-Cutback ¾"	BU8	Aggregate-Untreated Top 2"
BB4	Aggregate-Cutback 1"	C	Concrete-No Data
BB5	Aggregate-Cutback 1¼"	CB	Dowel Bar Retrofit
BB6	Aggregate-Cutback 1½"	CC	Concrete-Cont. Reinforced
BB8	Aggregate-Cutback 2"	CC1	Concrete-Cont. Rein. Size 1"
BC	Aggregate-Cement Treated	CC2	Concrete-Cont. Rein. Size 2"
BC1	Aggregate-Cement Trt Sand	CC3	Concrete-Cont. Rein. Size 3"
BC2	Aggregate-Cement Tr ½"	CD	Concrete-Doweled
BC3	Aggregate-Cement Tr ¾"	CD1	Concrete-Doweled Size1"
BC4	Aggregate-Cement Tr 1"	CD2	Concrete-Doweled Size 2"
BC5	Aggregate-Cement Tr 1¼"	CD3	Concrete-Doweled Size 3", 4"
BC6	Aggregate-Cement Tr 1½"	CD4	Concrete-Doweled POLFIBJNT
BC8	Aggregate-Cement Tr Top 2"	CF	Fabric Bond Breaker
BE	Aggregate-Emul.Asph.Fly A	CG	Pavement Grinding
BE1	Aggregate-Emul AspFly Sand	CJ5	Minor Joint & Spall Repair
BE2	Aggregate-Emul AspFly ½"	CJ6	Major Joint & Spall Repair
BE3	Aggregate-Emul AspFly ¾"	CJ7	Extensive Joint & Spall R
BE4	Aggregate-Emul AspFly 1"	CJ9	CRC Repair incl. ASR patch
BE5	Aggregate-Emul AspFly 1¼"	CL	Sawing & Sealing of Joint
BE6	Aggregate-Emul AspFly 1½"	CM1	Concrete-Mesh Size 1"
BE8	Aggregate-Emul AspFly 2"	CM4	Concrete-Mesh Size 4"
BL	Aggregate-Lime Treated	CP	Concrete-Plain
BL1	Aggregate-Lime Trt. Sand	CP1	Concrete-Plain Size1"
BL2	Aggregate-Lime Trt. ½"	CP2	Concrete-Plain Size 2"
BL3	Aggregate-Lime Trt. ¾"	CP3	Concrete-Plain Size 3", 4"
BL4	Aggregate-Lime Trt. 1"	CP4	Concrete-Plain POLFIBJNT
BL5	Aggregate-Lime Trt. 1¼"	CP8	Concrete-Plain POLFIBNOJNT
BL6	Aggregate-Lime Trt. 1½"	CR	Concrete-Mesh with Dowel
BL8	Aggregate-Lime Trt. Top 2"	CR1	Concrete-Mesh w/Dow Size 1
BP	Aggregate-Process in Place	CR3	Concrete-Mesh w/Dow Size 3"
BP1	Aggregate-PIP Sand	CS	Concrete-Crack & Seat
BP2	Aggregate-PIP ½"	CU	Undersealing
BP3	Aggregate-PIP ¾"	I	Interim Surfacing
BP4	Aggregate-PIP 1"	PA1	Patch, Asphalt 0-10% of Road
BP5	Aggregate-PIP 1¼"	PA2	Patch, Asphalt 11-20% of Road
BP6	Aggregate-PIP 1½"	PA3	Patch, Asphalt 21-30% of Road
BP8	Aggregate-PIP 2"	PA4	Patch, Asphalt 31-40% of Road
BR	Aggregate-Recycled Asphalt	PA5	Patch, Asphalt 41-50% of Road
BR1	Aggregate-Recyl Asp Sand	PA6	Patch, Asphalt 51-60% of Road
BR2	Aggregate-Recyl Asp ½"	PA7	Patch, Asphalt 61-70% of Road

PA8 Patch, Asphalt 71-80% of Road  
 PA9 Patch, Asphalt >80% of Road  
 TC Treatment-Asph. Crck Seal  
 TF High Friction Top Course  
 TG Treatment-Crushed Gravel  
 TG1 Treatment-Crushed Fine  
 TG2 Treatment-Crushed Coarse  
 TG3 Treatment-Crushed 3/8"  
 TG4 Treatment-Crushed 1/2"  
 TG5 Treatment-Crushed 5/8"  
 TG6 Treatment-Crushed 3/4"

TM Treatment- Micro Surface  
 TM3 Treatment-Micro Srfc Top 3/8"  
 TN Treatment- Nova Surface  
 TN6 Treatment-Nova Seal Top 3/4"  
 TS1 Treatment-Sand Seal Fine  
 TS2 Treatment-Sand Seal Coarse  
 TS3 Treatment-Sand Seal 3/8"  
 TS4 Treatment-Sand Seal 1/2"  
 VB1 Paver Bricks 4"X8"X2.8"

NUMBER OF STRUCTURES - The number of bridges over 20' in length within the highway segment. This excludes box culverts.

NUMBER OF BOX CULVERTS - The number of box culverts within the highway segment.

### 3 YR AVG. MAINTENANCE COSTS:

The following costs reflect the yearly average per mile cost associated with each segment. They are computed from actual segment maintenance costs from the previous three years that are then averaged to compute a yearly cost. This cost is then divided by the segment length to compute the average maintenance cost per mile.

MAINLINE - The average per mile costs associated with driving surface maintenance over the last three years.

SHOULDERS - The average per mile costs associated with shoulder maintenance over the last three years.

STRUCTURE - The average per mile cost associated with structure maintenance over the last three years.

OTHER - The average per mile cost of all other maintenance costs not included above for the segment over the last three years. This includes costs associated with drainage and erosion control, ditch cleaning, mowing, snow control, fence repair, and other miscellaneous costs that are not directly related to shoulder or structure maintenance.

TOTAL - The total average maintenance cost per mile for the segment for the past three years. This is the sum of the *Mainline*, *Shoulders*, *Structure*, and *Other* costs.

TOT 3YR MAINT. CONTRACT AMT - The three year AVERAGE amount expended only on maintenance contracts. These costs can fall into any of the categories listed above and are included in those averages.

### TRAFFIC:

CURRENT ADT - Current Average Daily Traffic of all traffic on this segment of highway.

PROJECTED 20 YR ADT - Average Daily Traffic Forecasted 20 years into the future on this segment of highway using the current ADT.

NUMBER OF TRUCKS - Current Average Daily Truck Traffic only on this segment of highway.

## CRASHES

Weighted Crash Rate - The type of crashes that have occurred along this segment of highway within the past three years are weighted in accordance with their severity. Using those weighted figures, the crash rate per million vehicle miles of travel is computed and recorded. Crashes are weighted in the following manner:

Fatal Crash	-	12 points
Injury Crash	-	3 points
Property Damage	-	1 points

Using these figures, the weighted crash rate per million vehicle miles of travel is computed as follows:

Segment Lengths 1 mile or Greater:

Weighted Crash Rate =  $[(\text{Total Crash points along segment} \times 1,000,000) \div 3] \div (\text{ADT} \times \text{Segment Length} \times 365)$ .

Segment Lengths Less Than 1 mile:

Weighted Crash Rate =  $[(\text{Total Crash points along segment} \times 1,000,000) \div 3] \div (\text{ADT} \times 365)$ .

NUMBER OF FATAL - The number of fatal crashes for the last three years. Injury and/or property damage crashes including fatalities are categorized here.

NUMBER OF INJURY - The number of injury crashes for the last three years. Property damage crashes including injuries are categorized here.

NUMBER OF PROPERTY DAMAGE - The number of property damage only crashes for the last three years.

## MAINLINE IMPROVEMENTS: (Data represents budget estimates and STIP projects as of the date listed in the Introduction).

PROJECT PROGRAMMED - If the segment is programmed for improvements, a "YES" will appear in this column. The programmed project can be identified by the presence of a PCN listed in the project data.

Two improvement projects can be listed for each segment. Each entry consists of the following information concerning each improvement:

- PCN - This is a unique project control number that is assigned to each project when it is programmed. This number is used for identification and cross reference purposes throughout the design, construction, and final payment of a project. This number only appears if the improvement is a programmed project.
- IMPROVEMENT TYPE - The type of improvement for which the cost is computed. Improvements listed are for mainline projects only. Things such as fencing projects, roadway lighting, rest area improvements, shoulder only improvements, erosion control, and similar projects are not included. Please refer to the current "STIP" for detailed programming information. The interpretations of the abbreviations follow:

NO DATA	No data	CRK SEAT ACO	Crack and seat/rubblize with AC overlay
AC OVERLAY	Asphalt concrete overlay	DO NOTHING	Do nothing (bridge, etc)
AC OVER PCCP	Asphalt overlay over concrete (No crack and seat)	GRINDING	Grinding only
BLOTTER	Blotter surfacing or reapplication	GRAVEL SURF	Gravel surfacing or resurfacing
BONDED OVLY	Bonded overlay	MICROSURFACE	Microsurfacing
COLD IP RCYL	Cold in place recycle	MILL AC OVLY	Mill and AC overlay
CHIP SEAL	Chip seal	MILL PC OVLY	Mill and PCC overlay
CRACK_LEVEL	Crack leveling	MILL S OVLY	Mill and Class S Asphalt Overlay
		MISC IMPROV	Miscellaneous major improvements

NOT OPTIMIZED	Not Optimized within analysis period		- (THK for interstate surfacing)
FULL DEP REC	Full Depth Reclamation	RECON BLOT	Reconstruct to blotter (BLOT) pavement
PAV REPAIR	Pavement repair	RECON PCCP	Reconstruct to rigid (TKSJD) pavement
		RECON CRC	Reconstruct to CRC Pavement
PAV RESTORE1	Pavement restoration 1 (<40% full depth joint repair)	RECON GRVL	Reconstruct to gravel
PAV RESTORE2	Pavement restoration 2 (>40% full depth joint repair)	PCCP RESURF	Remove and replace PCC or CRC
ROUTE/SEAL	Rout and seal cracks	SEAL JNTS	Saw and seal joints
RECON AC	Reconstruct to flexible (TONS) pavement	SHLD WIDNING	Shoulder Widening
		UB CRC OVLY	Unbonded CRC overlay
		UNDRSL/DBR	Undersealing/dowel bar retrofit

- ESTIMATED IMPROVEMENT COST - The estimated cost of the proposed improvement. Costs are expressed in thousands of dollars and present day values. Costs are for mainline improvements only and will exclude costs for rest area improvements and major bridge and interchange improvements.
- IMPROVEMENT YEAR - The optimized year that the improvement should take place within the 20 year analysis period based upon a forecasted budget, or the year the improvement is programmed if a PCN is present.