COMMONWEALTH OF MASSACHUSETTS
MassDOT

PAVEMENT DESIGN
NEW AND RECONSTRUCTED PAVEMENTS

City/Town   Hingham

Route No.   3A

From Station   1001+65   **To Station**   1088+25

No. of Lanes   2

Date Pavement Designed   2/12/2024 **Pavement Designer**   EJR

RECOMMENDED PAVEMENT STRUCTURE

Surface Course: 1.75" SUPERPAVE SURFACE COURSE - 12.5 (SSC - 12.5)

Intermediate Course: 2.5" SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC - 12.5)

Base Course: 4" SUPERPAVE BASE COURSE - 37.5 (SSC - 37.5)

Sub-base: 4" DENSE GRADED CRUSHED STONE

Sub-grade: 12" GRAVEL BORROW (M1.03.0 TYPE b)

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NEW AND RECONSTRUCTED PAVEMENTS
DATA SHEET 1: PAVEMENT DESIGN STRUCTURAL DESIGN DATA

City/Town   Hingham

Route No.   3A

From Station   1001+65   **To Station**   1088+25

No. of Lanes   2   **Highway System**   MA   **Date**   2/12/2024

Current ADT   14,725

Terminal Serviceability Index (TSI)=2.5

(a) Day of Opening ADT (Date year)[1]	29,938	(2025)
(b) Future ADT (Date(a) + 40 years)[2]	36,548	(2065)
(c) Mean ADT = [(a)+(b)]/2	33,245	
(d) Mean ADT in One Direction = (c)/2	16,623	
(e) Mean Truck Percentage ("T" ADT)	2.50%	
(f) Mean Truck ADT in One Direction (d) x (e)	416	
(g) ESAL Application per 1000 Trucks and Combinations - Exhibit 9-2	880	
(h) Number of ESALs Per Day in One Direction [(f) X (g)] / 1000 (T$_{18}$)	366	

Comments:

1. Anticipated traffic when facility is opened to travel
2. Under certain conditions, this may change to a larger or shorter period

NEW AND RECONSTRUCTED PAVEMENTS
DATA SHEET 2: DETERMINATION OF STRUCTURAL NUMBER (SN)

Design Lane ESAL Applicatoin (T_{18})

For 2-Lane Undivided Highway

Design Lane T_{18} = 1.00 x Total T_{18}* = 1.00 x   366 =   366

For 4-Lane Undivided Highway

Design Lane T_{18} = 0.90 x Total T_{18}* = 0.90 x   =

Design 6 or More (Total Lanes) Divided Highway

Design Lane T_{18} = 0.80 x Total T_{18}* = 0.80 x   =

Design DBR + SSV Exhibits 9-4, 9-5, 9-7, Sections 9.3 & 9.4

Subbase   Cr. Stone **DBR=**   40   **SSV=**   6.6

Subgrade   Gravel **DBR=**   30   **SSV=**   6.2

Design Structural Number (SN)

Apply Design SSV and Design Lane T_{18} from above to Design Nomograph (Exhibit 9-8)

	From Exhibit 9-8	**+15%**
Above Subbbase..=	2.10	2.42
Above Subgrade..=	2.25	2.59

NEW AND RECONSTRUCTED PAVEMENTS
DATA SHEET 3: PAVEMENT STRUCTURAL NUMBER (SN)

$$SN = D_1a_1 + D_2a_2 + D_3a_3 + D_4a_4 + D_5a_5$$

Surface Course

	Material	1.75" SUPERPAVE	$D_1a_1 =$	1.75	x	0.44	=	0.77

Intermediate Course

	Material	2.5" SUPERPAVE	$D_2a_2 =$	2.5	x	0.44	=	1.1

Base Course

	Material	4" SUPERPAVE	$D_3a_3 =$	4	x	0.34	=	1.36
		Total SN Above Sub-grade =		**3.23**	**>**	**2.42**		

Sub-base (Foundation)

	Material	4" CRUSHED STONE	$D_4a_4 =$	4	x	0.14	=	0.56
		12" GRAVEL BORROW	$D_5a_5 =$	12	x	0.11	=	1.32
		Total SN Above Sub-grade =		**5.11 >**		**2.5875**		

Where
- $D_1 =$ Surface Course Thickness, inches
- $D_2 =$ Intermediate Course Thickness, inches
- $D_3 =$ Base Course Thickness, inches
- $D_4 =$ Sub-base Course Thickness, inches
- $D_5 =$ Sub-base Course Thickness, inches
- $a_1 =$ Coefficient of Relative Strength, Surface Course
- $a_2 =$ Coefficient of Relative Strength, Intermediate Course
- $a_3 =$ Coefficient of Relative Strength, Base Course
- $a_4 =$ Coefficient of Relative Strength, Sub-base Course
- $a_5 =$ Coefficient of Relative Strength, Sub-base Course

Comments: